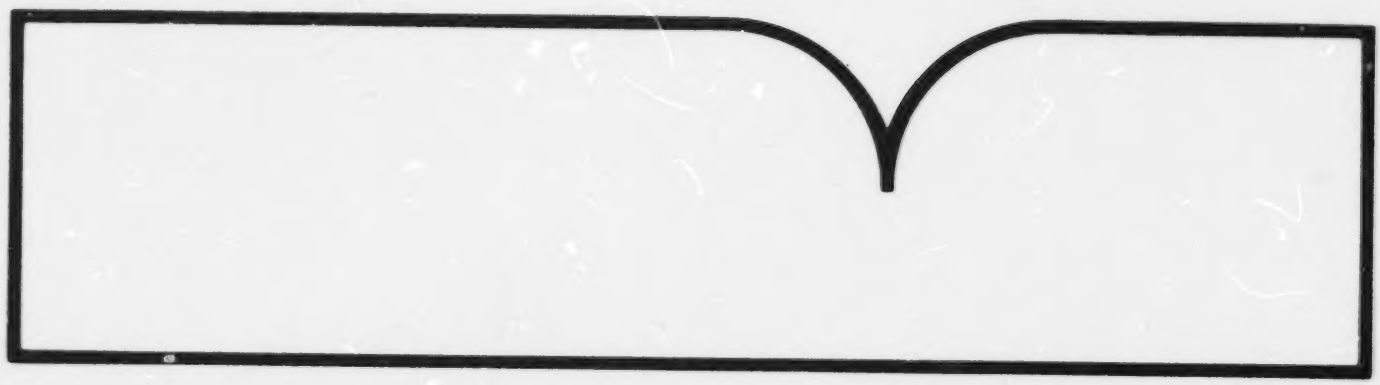
PB90-114836

Superfund Record of Decision (EPA Region 9)
Fairchild Semiconductor (S San Jose), CA
(First Remedial Action), March 1989

(U.S.) Environmental Protection Agency, Washington, DC

20 Mar 89



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16. Abstract (Limit: 200 words)

The Fairchild Semiconductor (S. San Jose) site is a former semiconductor manufacturing facility in San Jose, California. Operations were conducted at the site from April 1977 until it closed in October 1983. In late 1981, Fairchild Semiconductor Corporation discovered that an underground organic solvent waste tank had failed, resulting in soil and on- and offsite ground water contamination by a mixture of solvents. TCA contamination was discovered exceeding drinking water standards in a public drinking water supply well located approximately 1,800 feet downgradient from the site. The well was subsequently destroyed and sealed; however, several wells remain active downgradient. Fairchild has been investigating and cleaning up soil and ground water pollution at the facility since contamination was first detected in 1981. Interim actions taken by Fairchild include source removal and onsite soil cleanup (removal of defective tank and excavation of 3,389 yd^3 of contaminated soil), installation of a slurry wall around the perimeter of the site, conducting pilot studies for onsite aquifer flushing and in situ soil vapor extraction, hydraulic containment of the plume with onsite and limited offsite ground water treatment using air stripping, and implementation of ground water conservation measures. Although the interim cleanup actions have significantly decreased the size and contamination of the plume, some areas outside the slurry wall still exceed State drinking water act . levels, and onsite soil

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision - Fairchild Semiconductor (S. San Jose), CA
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (PCE, TCA, DCE, xylenes)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 64
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Agency

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Emergency and
Remedial Response

EPA/ROD/R09-89/028
March 1989

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EPA

Superfund Record of Decision:

Fairchild Semiconductor (S San Jose), CA

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EPA/ROD/R09-89/028
Fairchild Semiconductor (S. San Jose), CA
First Remedial Action - Final

16. Abstract (Continued)

and ground water still contain high concentrations of chemicals. This ROD provides a final remedy which addresses onsite soil and ground water, and offsite ground water contamination. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCA, DCE, and xylenes.

The selected remedial action for this site includes onsite soil vapor extraction (aeration); onsite shallow ground water and offsite ground water from well RW-25 pumping and treatment using air stripping, followed by offsite reinjection of treated ground water and discharge to surface water after aquifer reuse capacity has been exhausted; deep ground water from offsite wells RW2 and RW22, followed by discharge of untreated ground water to surface water via storm drains; conducting laboratory and field study of biodegradation of onsite chemicals; implementing institutional controls including deed restrictions to limit ground water and land use; and ground water monitoring. The estimated present worth cost for this remedial action is $9,393,100 which includes total O&M costs of $7,231,700.

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RECORD OF DECISION

Fairchild Semiconductor Corporation
San Jose, California

February 1989

PART 1

DECLARATION

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RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION:
Fairchild Semiconductor Corporation
San Jose, California

STATEMENT OF BASIS AND PURPOSE

This document serves as EPA concurrence with the remedial action for the Fairchild Semiconductor Corporation (Fairchild) site in San Jose, as approved by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). The RWQCB approved this remedial action in conformance with §13000 and §13304 of the California Water Code, State of California Health and Safety Code §25356.1, CERCLA, as amended by SARA, and the National Contingency Plan.

This EPA concurrence with the State's selection of remedy is based upon the RWQCB's Staff Report, the Remedial Action Plan, the Site Cleanup Requirements Order, the Responsiveness Summary, and the Administrative Record for this site. The attached index lists the items comprising the Administrative Record.

DESCRIPTION OF REMEDIAL ACTION

The selected remedy provides for final cleanup requirements related to onsite soils and groundwater, and offsite groundwater contamination. Fairchild has conducted interim remedial activities under RWQCB orders since 1982. In 1986, the Company installed a slurry wall around the entire property and keyed it into the first competent aquitard below the site, containing the highest levels of contamination within the onsite area. The major components of the final selected remedy include:

- Onsite soil vapor extraction
- Onsite shallow groundwater extraction and treatment with airstripping
- Reinjection of all onsite, and some offsite treated groundwater
- Offsite deep groundwater extraction and air stripping with nozzles into storm drains
- Discharge to surface water under NPDES permit of any treated groundwater remaining after reuse capacity has been exhausted

DECLARATION

EPA concurs with the remedy selected by the RWQCB for the Fairchild site.

The selected remedy is protective of human health and the environment, attains Federal and state requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy satisfies the statutory preference for remedies that reduce toxicity, mobility, and/or volume as a principal element. It also utilizes permanent solutions to the maximum extent practicable. The 5-year facility review provision has been included as part of the RWQCB Site Cleanup Requirements Order.

3.20.89
Date

John Wise
for Daniel W. McGovern
Regional Administrator

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PART 2

STAFF REPORT

REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

INTERNAL MEMO

TO: Steven R. Ritchie, Executive Officer

FROM: Elizabeth Cameron, Assoc. WRCE

DATE: January 5, 1989

SIGNATURE: Elizabeth Cameron

SUBJECT:

STAFF REPORT

FINAL CLEANUP PLAN FOR FAIRCHILD SEMICONDUCTOR CORPORATION

SAN JOSE FACILITY

Since 1981, Fairchild Semiconductor Corporation has been investigating and cleaning up soil and groundwater pollution at their San Jose facility. Due to the risk to human health and the environment, the Fairchild-San Jose site was proposed for inclusion on the federal Superfund list in 1984.

The Regional Board has previously adopted several Orders concerning the pollution at this site. In November 1982, the Regional Board issued an NPDES permit for the discharge of polluted groundwater (Order No. 82-61). Site Cleanup Requirements were adopted in August 1986 (Order No. 86-62), revised in March 1987 (Order No. 87-16), and amended in March 1988 (Order No. 88-46). Regional Board Order 87-16 required Fairchild to submit a final cleanup plan for the site. Subsequently, Fairchild submitted a revised Remedial Action Plan (RAP) on October 7, 1988. Regional Board staff have reviewed this RAP and drafted the attached Site Cleanup Requirements (SCR) for regulating final cleanup of the site and Waste Discharge Requirements (WDR/NPDES permit) for reinjection or reuse of the extracted groundwater and/or discharge of the extracted groundwater to Canoas Creek. This staff report provides background information on and staff's rationale for the recommended SCR and NPDES permit.

The Tentative Orders were officially available for public comment from November 8 through December 8, 1988. The SCR and NPDES permit have been revised to address comments received during the public comment period.

BACKGROUND

Site Location and Description. Fairchild has owned property at 101 Bernal Road in San Jose since 1975 (Figure 1 - Site Location). Fairchild operated a semiconductor manufacturing facility at the site from April 1977 until it closed in October 1983. The facility has been inactive since 1983.

In November and December 1981, Fairchild discovered that an underground organic solvent waste tank had failed, releasing a mixture of solvents to the subsurface. A public drinking water supply well, Great Oaks Water Company well number GO-13, located approximately 1800 feet down-gradient from the site, was contaminated by the release, causing a risk to public health. TCA concentrations of 5,700 ppb entered the well while it was being used as a drinking water supply well; the drinking water standard for TCA is 200 ppb. GO-13 was removed from service on December 7, 1981, as soon as the contamination was detected, and has since been destroyed and sealed.

January 5, 1989

STAFF REPORT

In 1987, all issued and outstanding shares of Fairchild stock were sold be Schlumberger Technology Corporation to National Semiconductor Corporation. Following the sale, Schlumberger retained all environmental liabilities associated with its past activities at the site. Schlumberger is currently managing the cleanup on behalf of Fairchild. Schlumberger has entered into a contract to sell the 22 acre site to the Koll Company. Koll plans to develop the property as a neighborhood shopping center.

Subsurface Investigation. Fairchild has drilled more than 239 soil borings and installed over 124 groundwater monitoring and extraction wells in order to define and contain soil and groundwater pollution from their San Jose facility. Three aquifers, designated the A, B, and C aquifers, have been contaminated with organic solvents. The A aquifer is first encountered at depths of 10 to 20 feet below the ground surface and extends to depths of up to 60 feet. The A aquifer is not continuous off-site and is currently generally dewatered. The B aquifer is generally located between depths of 60 and 120 feet below ground surface. The C aquifer is generally found between 150 and 190 feet below ground surface. Only trace levels of chemicals have ever been detected below the B aquifer on-site or below the C aquifer off-site.

The following chemicals are the primary pollutants that have been detected in soils and groundwater on-site (within Fairchild's property boundaries):

1. 1,1,1-trichloroethane (TCA),
2. 1,1-dichloroethene (DCE),
3. Isopropyl alcohol (IPA),
4. Xylenes,
5. Acetone,
6. 1,1,2-trichloro-1,2,2-trifluoroethane (Freon-113), and
7. Tetrachloroethene (PCE).

Past and current chemical concentrations detected in on-site groundwater are listed in Table 1.

Off-site, chemicals have been detected in groundwater to a depth of 190 feet below ground surface. TCA, DCE, and Freon-113 are the chemicals that have been detected off-site, with TCA being detected most frequently and in the highest concentrations. Off-site chemical concentrations are listed in Table 2.

Interim Actions. Interim actions taken by Fairchild since the discovery of the release in 1981 include:

1. SOURCE REMOVAL AND SOIL CLEANUP - Actions taken to prevent further solvent migration from the source area include removal of the defective tank and excavation of 3,389 cubic yards of on-site soil containing an estimated 38,000 pounds of chemicals. Past and current concentrations detected in on-site soils are listed in Table 3. Off-site soils were not directly effected by the Fairchild release, although chemical residuals may remain in soils that have been or are effected by the groundwater plume.

2. SOIL-BENTONITE SLURRY WALL - In 1986 Fairchild installed a 3-foot thick slurry wall around the perimeter of their property. The slurry wall is

keyed into the BC aquitard. By installing the slurry wall and establishing an inward gradient by pumping small amounts of groundwater within the confines of the slurry wall, Fairchild has minimized further migration of on-site chemicals into off-site groundwater.

3. PILOT STUDIES - Fairchild has conducted on-site pilot studies to determine the effectiveness of on-site aquifer flushing and in-situ soil aeration in cleaning up on-site groundwater and soils. On-site flushing was determined to be ineffective in removing chemicals from the A aquifer. In-situ soil aeration is a technique for removing volatile chemicals by applying a vacuum on the polluted soils. This technique was determined to be effective in removing volatile chemicals from on-site soils.

4. MIGRATION CONTROL AND GROUNDWATER CLEANUP - Through the use of groundwater extraction wells, the plume has been under hydraulic control since 1982. Fairchild's groundwater extraction program has reduced the length of the plume from 4,900 feet in October 1982 to approximately 2400 feet in September 1988 (Figure 2). The maximum concentration of TCA detected off-site has been reduced to 430 ppb (9-12-88 data). As cleanup has progressed, Fairchild has been able to reduce their pumping rate from a maximum of 9217 gpm (14,870 AF/yr) in February 1984 to 1042 gpm (1680 AF/yr) as of September 1988. Fairchild's groundwater extraction program has removed approximately 90,000 pounds of chemicals (75,000 pounds from on-site groundwaters and 15,000 pounds from off-site groundwaters).

5. GROUNDWATER TREATMENT - Since 1982 Fairchild has been discharging the extracted groundwater through storm drains to Canoas Creek under an NPDES permit. Considering that discharge concentrations from most parts of the plume are well below water quality standards, the original NPDES permit allowed the bulk of the extracted groundwater to be discharged to Canoas Creek without treatment. Groundwater extracted on-site and from off-site well RW-25 is treated using air stripping prior to discharge.

6. GROUNDWATER CONSERVATION - Groundwater polluted by the Fairchild release is part of the Santa Teresa groundwater basin. Low rainfall, reduced efficiency in artificial recharge ponds, and pumping for water supply and aquifer remediation have caused declines in the groundwater levels in the Santa Teresa Basin. Considering these water level declines, the very low levels of chemicals in the C aquifer (< 5 ppb), and that pumping from the C aquifer for discharge to Canoas Creek may be a waste or unreasonable use of water, the Regional Board issued Order 88-46 in March 1988. This Order allowed Fairchild to implement a phased water conservation program in the C aquifer. As a result of this water conservation program, Fairchild eliminated all groundwater extraction from the C aquifer on September 6, 1988.

RISKS POSED BY THE RELEASE

The 1981 release of contaminants to the subsurface created a significant risk to human health and the environment. The primary threat was to the public through the consumption of drinking water containing chemicals greatly in excess of DHS drinking water action levels. This immediate threat was eliminated by removing drinking water supply well GO-13 from service and by containing the

plume so that other drinking water supply wells were not contaminated by the release.

Interim cleanup actions have significantly decreased both the size of the plume and the concentrations within the plume; however, some areas of the plume outside the slurry wall currently contain concentrations of chemicals in excess of DHS drinking water action levels. A potential threat to the public would exist if new drinking water supply wells were installed in these areas. A well permit must be obtained from the Santa Clara Valley Water District (SCVWD) to install wells in the vicinity of the Fairchild plume. The SCVWD has a policy of advising against installing wells in areas known to contain chemicals, even when concentrations are below health standards.

The slurry wall has minimized the migration of chemicals located on-site into off-site aquifers by minimizing groundwater flow from the on-site aquifers. This has greatly benefitted the off-site cleanup; however, high concentrations of chemicals remain in on-site soils and groundwater. Groundwater concentrations on-site are significantly in excess of health criteria; consequently, on-site aquifers cannot currently be used as a source of drinking water. (Current chemical concentrations on-site and their respective drinking water standards are listed in Table 1.)

There are several drinking water supply wells located down-gradient from the release. If cleanup activities were stopped today and assuming the slurry wall was effective in minimizing the concentrations of on-site chemicals migrating into off-site aquifers, TCA concentrations up to 13 ppb may reach five existing drinking water supply wells. These concentrations are well below the DHS drinking water action level of 200 ppb for TCA.

If cleanup activities were stopped today, chemicals off-site would also spread through a larger area of the subsurface. With time, on-site chemicals would begin to slowly migrate through the slurry wall. Dilution and potential degradation would reduce the concentrations in the aquifers off-site although a larger area of the environment would be effected.

Risks to public health and the environment due to air emissions, chemicals entering surface waters, or exposure to surface soils are minimal.

DEVELOPMENT OF REMEDIAL ACTION PLAN

Regional Board Order 87-16 required Fairchild to submit a report evaluating the effectiveness of interim cleanup and analyzing alternatives for final remediation of the site. Fairchild has subsequently submitted and revised a draft Remedial Action Plan (RAP). Regional Board staff have determined that the technical information contained in the revised RAP submitted October 7, 1988, is acceptable for developing a final cleanup plan for the site. In making this determination, staff did not accept the portions of the RAP addressing: (1) Applicable or Relevant and Appropriate Requirements (ARARs), and (2) the NPDES permit. These areas are addressed in the Addendum to the RAP dated December 16,. 1988, prepared by agency staff, and included as Attachment 1 of this staff report. Differences between staff's recommended cleanup plan and Fairchild's recommended cleanup plan are discussed in this staff report.

The Fairchild-San Jose facility is proposed for inclusion on the federal Superfund list. Consequently, the adopted RAP and the Regional Board's actions in the SCR must fulfill: (1) the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendment and Reauthorization Act (SARA), (2) the National Contingency Plan (NCP) requirements for a remedial investigation and feasibility study (RI/FS), and (3) Health and Safety Code Section 25356.1 requirements for a remedial action plan. To ensure compliance with these laws and regulations, EPA and DHS staff have also reviewed and commented on the RAP.

Hazard Indices. Fairchild evaluated a variety of groundwater cleanup levels using Hazard Indices (HIs). Whereas drinking water standards are developed for each individual chemical, the HI is a method for assessing the public health risk associated with exposure to multiple chemicals. An HI equal to 1 indicates that all chemicals are at or below national Maximum Contaminant Levels (MCLs) for drinking water. DHS drinking water action levels for the chemicals of concern at the Fairchild site are equal to or more stringent than MCL's. Therefore, DHS drinking water action levels, rather than MCLs, have been used in calculating HIs for the Fairchild-San Jose site. In the RAP, the HI for non-carcinogenic compounds is calculated as shown below.

$$\sum_{i=1}^{n} \frac{\text{concentration of chemical "i" in the groundwater}}{\text{DHS drinking water action level for chemical "i"}}$$

Since only TCA and DCE are currently detected in the off-site aquifers, the off-site HI can be calculated as follows:

$$\frac{\text{conc. of TCA (ppb)}}{\text{200 ppb TCA}} + \frac{\text{conc of DCE (ppb)}}{\text{6 ppb DCE}} = \text{HI for off-site aquifer}$$

The values for MCLs or DHS action levels may increase or decrease based on information obtained in the future. If these values change, the Hazard Index must be recalculated to reflect the changed values.

HIs are usually calculated separately for potential carcinogenic chemicals and non-carcinogenic chemicals. There are no known potential carcinogenic chemicals in off-site groundwaters. One potential carcinogen, PCE, has been detected on-site. Since only one potential carcinogen has been detected on-site and none have been detected off-site, Hazard Indices have been calculated only for non-carcinogenic chemicals. The maximum on-site Hazard Index for the carcinogenic compound is 21.3 (PCE is present on-site at a maximum concentration of 85 ppb).

In the RAP, cleanup goals and alternatives are evaluated separately for the on-site and off-site areas due to the presence of the slurry wall and the differences in types, locations, and concentrations of chemicals on-site and off-site. On-site and off-site cleanup alternatives are summarized in this staff report. A more detailed description and evaluation of these alternatives is included in Fairchild's RAP submitted October 1988.

STAFF REPORT

OFF-SITE CLEANUP

Off-site cleanup levels. Fairchild evaluated alternatives that will achieve cleanup to the following levels off-site:

1. EXISTING CONDITIONS. This cleanup level would allow the loss of beneficial uses (as defined in the San Francisco Bay Basin Plan) at the well head and in the off-site aquifers. The maximum HI off-site is approximately 2 in the B aquifer. Hazard indices in the C aquifer are below 0.025.

2. HAZARD INDEX = 1.0. All off-site aquifers would be cleaned up to at least current DHS drinking water action levels. It is estimated that this cleanup goal could be achieved within 1 year.

3. HAZARD INDEX = 0.25. All off-site aquifers would be cleaned up to a level at least four times more stringent than current DHS drinking water action levels. It is estimated this cleanup goal could be reached in 5 years.

4. RESTORE TO BACKGROUND. To achieve this cleanup level, concentrations of all pollutants in all off-site aquifers would be reduced to below laboratory detection levels. Fairchild has estimated the length of time required for cleanup to this level to be 14 years; however, it may not be technically possible to reach this cleanup goal. Because of the potential technical infeasibility and considering the estimated amount of groundwater extraction required to achieve this cleanup level (18,000 acre-feet compared to 2,200 acre-feet to reach an HI of 0.25), detailed cleanup alternatives were not developed for this cleanup level.

(In response to public comment and staff's subsequent request, Fairchild also evaluated the time required and amount of groundwater that would be extracted to achieve a Hazard Index of 0.10.)

Off-site cleanup alternatives. Fairchild developed detailed analyses of 7 off-site cleanup alternatives. Costs for each off-site alternative are presented in Table 4.

Alt.1 NO FURTHER ACTION. In this alternative, current groundwater extraction would be terminated. Groundwater monitoring would be continued to assess changes in the extent of and concentrations in the plume. It is anticipated that detectable levels of chemicals could reach existing drinking water supply wells within six months to 5 years. Concentrations in all existing drinking water supply wells would remain well below the DHS drinking water action level of 200 ppb TCA. Of the five drinking water supply potentially effected by the Fairchild plume, Great Oaks well GO-4 would receive the highest TCA concentrations (up to 13 ppb).

Alt.2 GROUNDWATER EXTRACTION AND DISCHARGE TO CANOAS CREEK. This alternative is essentially a continuation of the interim off-site groundwater extraction program with the addition of nozzle aeration. Groundwater would continue to be extracted from the B aquifer with the rate of extraction decreasing as the plume recedes. The groundwater extracted from most wells would pass through nozzles to aerate the water and reduce the concentration of volatile compounds prior to discharge through storm drains

to Canoas Creek. Nozzle treatment should reduce the concentration of volatile compounds (primarily TCA) by 10-50 percent. Groundwater from off-site well RW-25 would be piped on-site and treated using air stripping prior to discharge.

Alt.3 GROUNDWATER EXTRACTION, TREATMENT TO 5 PPB, AND DISCHARGE TO COYOTE CREEK PERCOLATION PONDS. As in Alt. 2, groundwater extraction from the B aquifer would continue. Alt. 2 and 3 differ in that Alt. 3 contains a water conservation measure and more effective and costly groundwater treatment. All extracted groundwater would be treated using air stripping to reduce concentrations of each volatile organic chemical to below 5 ppb. The treated water would then be piped to the Coyote Creek percolation ponds to provide groundwater recharge.

Alt.4 GROUNDWATER EXTRACTION, TREATMENT TO 5 PPB, AND REINJECTION. Groundwater extraction and treatment is the same in this alternative as in Alt. 3. The difference is in the method used for water conservation. In this alternative, groundwater recharge would be enhanced through the direct reinjection of the treated groundwater into the off-site B aquifer.

Alt.5 GROUNDWATER EXTRACTION, TREATMENT TO 5 PPB, AND DISCHARGE TO CANOAS CREEK. This alternative is the same as Alt. 2 except that all groundwater would be treated using air stripping to meet discharge limits of 5 ppb for each volatile organic chemical prior to discharge to Canoas Creek.

Alt.6 GROUNDWATER EXTRACTION AND DISCHARGE TO SANTA TERESA GOLF COURSE IRRIGATION POND. The groundwater extraction program in this alternative is the same as that in Alt. 2 through 5. On a seasonal basis, the extracted groundwater would be piped to the Santa Teresa Golf Course irrigation pond. Irrigation would consume all extracted groundwater for 9 months each year. During the other 3 months, the excess groundwater would be discharged after nozzle aeration to Canoas Creek.

Alt.7 GROUNDWATER EXTRACTION AND DISCHARGE TO CANOAS CREEK WITH OFF-SITE REINJECTION OF GROUNDWATER TREATED AT THE ON-SITE TREATMENT SYSTEM. This alternative is identical to Alt. 2 except that groundwater from off-site well RW-25 and groundwater extracted on-site would be treated using air stripping and then reinjected outside the slurry wall. In Alt. 2, this water is treated and then discharged to Canoas Creek.

With the exception of Alt. 1 (No Action), each alternative is capable of achieving a cleanup level of HI=1.0 or HI=0.25, depending on the length of time groundwater extraction continues. Groundwater quality in the C aquifer is currently well below an HI of 0.25. Therefore, off-site pumping for any alternative would be required only in the B aquifer to achieve an HI of 0.25.

In the B aquifer, either cleanup goal is expected to be achieved most quickly in areas furthest down-gradient from the original source of pollution. The plume has therefore been divided into the three zones shown in Figure 3. The estimated cleanup time for each zone and the total volume of water to be extracted from the B aquifer are as shown in Table 6. This information is also presented graphically at the bottom of Figure 4.

STAFF REPORT

ON-SITE CLEANUP

On-site cleanup alternatives. Fairchild developed detailed analyses of 6 on-site cleanup alternatives. Costs for each on-site alternative are summarized in Table 5.

Alt.1 NO FURTHER ACTION. In this alternative, the extraction of groundwater from on-site well WCC-20(B) would be discontinued and no further soils treatment would be conducted. Groundwater quality and groundwater level monitoring would be continued to detect migration of chemicals from within the slurry wall boundaries.

Alt.2 ACHIEVE AND MAINTAIN AN INWARD HYDRAULIC GRADIENT ACROSS THE SLURRY WALL. On-site Alt. 2 involves long-term pumping of groundwater from within the slurry wall. If no groundwater is pumped within the slurry wall, groundwater containing chemicals would slowly migrate through the slurry wall into off-site aquifers. Pumping within the slurry wall would limit the migration of on-site chemicals to off-site aquifers. The extracted groundwater would be treated using air stripping prior to reuse, reinjection, or discharge to Canoas Creek.

Alt.3 IN-SITU SOIL AERATION OF THE A AQUIFER AND AB AQUITARD IN AREAS WITH TCA CONCENTRATIONS GREATER THAN 10 PPM AND IN-SITU SOIL AERATION OF THE B AQUIFER. In this alternative, 37 air extraction wells (similar to water extraction wells but installed above the water table) would be installed in on-site soils polluted with greater than 10 ppm TCA. A vacuum would be applied to the air extraction wells to draw volatile chemicals out of the soil. The chemical-laden air would pass through an activated carbon system prior to being discharged to the atmosphere. Partial dewatering of soils in the B aquifer would be required for the aeration system to be effective in deeper soils.

Fairchild proposes to operate the in-situ soil aeration system in soils with greater than 10 ppm TCA until the chemical removal rate from each air extraction well has decreased to 10 percent of the initial removal rate or the removal rate is declining at a rate of less than 1 percent per day over a 10 day period. The objective of this alternative would be to reduce on-site chemical concentrations to maintain an off-site HI of 0.25. Fairchild anticipates operating the system for 6 months in the A aquifer and AB aquitard and 1 year in the B aquifer. The system is expected to remove 12,000 pounds of chemicals in 6 months, at which time the highest average TCA concentration in the soil would be approximately 200 ppm. The expected Hazard Index would be approximately 10.

Alt.4 IN-SITU SOIL AERATION OF THE A AQUIFER AND THE AB AQUITARD IN AREAS WITH TCA CONCENTRATIONS GREATER THAN 1 PPM AND IN-SITU SOIL AERATION OF THE B AQUIFER. This alternative uses the same treatment described in Alt. 3 applied to a larger area of polluted soil. Soils with greater than 1 ppm TCA would be treated using 61 air extraction wells. The system would be operated until the chemical removal rate decreases to the point described in Alt. 3. Fairchild anticipates operating the system for 6 months to remove an estimated 12,100 pounds of chemicals. This alternative would also maintain an off-site HI of 0.25.

Alt.5 IN-SITU SOIL AERATION OF THE A AQUIFER, UNSATURATED B AQUIFER, AND THE AB AQUITARD IN AREAS WITH TCA CONCENTRATIONS GREATER THAN 10 PPM AND GROUNDWATER FLUSHING OF THE SATURATED B AQUIFER TO AN HI=1.0. In this alternative, in-situ soil aeration would be combined with groundwater flushing of the saturated B aquifer to achieve an HI=1.0 on-site. Groundwater flushing would be accomplished by extracting groundwater on-site and from two off-site up-gradient wells (as necessary) and reinjecting the combined flow into the on-site B aquifer. The water would be treated using air stripping prior to reinjection into nine on-site wells. The in-situ soil aeration system would be operated until TCA concentrations in the soil are reduced to 10 ppm. It is expected that groundwater flushing at up to 250 gpm would continue for up to 6 years.

Alt.6 IN-SITU SOIL AERATION OF THE A AQUIFER, THE UNSATURATED B AQUIFER, AND THE AB AQUITARD IN AREAS WITH TCA CONCENTRATIONS GREATER THAN 1 PPM AND GROUNDWATER FLUSHING OF THE SATURATED B AQUIFER TO AN HI=0.25. This alternative is very similar to Alt. 5 except that the in-situ soil aeration would effect a larger area and the aeration combined with groundwater flushing would continue until an HI of 0.25 is achieved in on-site aquifers. Soil TCA concentrations would be reduced to a maximum of 1 ppm. It is estimated that soil and groundwater treatment would continue for 11 years. It may not be technically feasible to achieve an on-site HI of 0.25 or to reduce soil concentrations to 1 ppm.

Biodegradation Study. Fairchild also proposed a biodegradation study as a component of on-site cleanup. This study could be conducted in conjunction with on-site alternatives 1,2,3, or 4. The biodegradation study would use information obtained on-site and in the laboratory to attempt to quantify the rate of natural biodegradation of TCA and DCE. No nutrients or microbiological cultures would be added to enhance biodegradation of on-site chemicals. Rather, the study would evaluate biodegradation under the conditions existing at the Fairchild-San Jose site. The study would be conducted over a 4 year period.

FAIRCHILD'S PROPOSED CLEANUP PLAN

In the RAP, Fairchild recommended implementing off-site Alternative 2 (Groundwater Extraction and Discharge to Canoas Creek) to cleanup off-site aquifers to an HI of 0.25. For on-site cleanup, Fairchild recommended Alternative 3 (In-situ Aeration of the A Aquifer and AB Aquitard in Areas with TCA Concentrations Greater Than 10 ppm and In-situ Aeration of the B Aquifer) and the Biodegradation Study.

Fairchild recommended this plan because:

1. The plan protects public health and the environment by adopting a cleanup goal for off-site aquifers of HI=0.25.

2. The plan provides for groundwater conservation by reducing groundwater extraction through the sequential shut down of extraction wells as the cleanup goal is achieved in different areas off-site.

3. The plan incorporates feasible and mature as well as innovative technologies.

4. The plan effectively reduces chemical concentrations on-site to a level that will ensure compliance with the off-site cleanup goal of HI=0.25.

5. The plan effectively removes chemicals from off-site aquifers.

STAFF CONCERNS WITH FAIRCHILD'S PROPOSED PLAN

The cleanup plan proposed by Fairchild does not completely satisfy staff concerns.

1. Groundwater Conservation. Fairchild's plan relies on the sequential shut down of extraction wells as the boundaries of the plume recedes for groundwater conservation. (Reuse measures may also be employed, but final measures have not yet been presented to staff.) Regional Board staff agree that groundwater conservation measures are limited for the Fairchild cleanup. Groundwater extraction is expected to continue for 5 years; however, the bulk of the extraction (560 gpm out of a total anticipated extraction of 610 gpm) is expected to be curtailed in 2 years. Fairchild anticipates that it would take 9 to 16 months to implement treatment and reinjection/reuse alternatives for conserving groundwater. Therefore, permanent reuse measures appear unwarranted for the groundwater that will only be extracted for 2 years. Intermittent reuse (e.g., for construction purposes or local irrigation) may be possible.

   Groundwater will be extracted from off-site well RW-25 and possibly from on-site wells for the entire 5 years. Regional Board staff believe reinjection/reuse facilities are warranted for this part of the extraction and have incorporated a partial reinjection element into staff's proposed plan (described below). Fairchild opposes partial reinjection because of: (1) potential clogging of reinjection wells, (2) potential migration of pollutants into new areas of the aquifer, and (3) cost. Regional Board staff do not expect (1) and (2) to be significant problems due to the low flow rate and the low concentrations of chemicals that would be injected. Furthermore, these concerns can be evaluated in a short term study. The increase in cost ($419,700) to reinject this amount of water (480 acre-feet) is not significant compared to the anticipated total cost of cleanup of $38,000,000.

2. On-site Groundwater Cleanup Levels. Fairchild's proposed plan for on-site cleanup would result in an estimated HI of 10 in on-site aquifers. Regional Board staff believe lower levels are warranted and feasible. In addition to the potential for off-site migration of chemicals within the slurry wall, groundwater contained within the boundaries of the slurry wall is a potential source of drinking water. MCLs must be achieved for potential sources of drinking water. (Exceptions to attaining MCLs are discussed on page 16.)

   Fairchild's recommended plan would establish on-site cleanup levels to maintain an HI of 0.25 outside the slurry wall. Considering that slurry walls have only been constructed during the past 50 years (a short time compared to the length of time off-site aquifer protection would be required), reliance on the slurry wall for containment of chemicals should be minimized. Regional Board staff are also concerned that use of the slurry wall as a permanent cleanup technique to contain on-site chemicals effectively creates a 22-acre

hazardous waste disposal area. Every reasonable effort should be made to remove chemicals from on-site soils and groundwater and to restore on-site aquifers to drinking water quality.

3. Operation of the In-situ Soil Aeration System. Fairchild proposes to operate the in-situ soil aeration system in soils with greater than 10 ppm TCA until the chemical removal rate from each air extraction well has decreased to 10 percent of the initial removal rate or the removal rate is declining at a rate of less than 1 percent per day over a 10 day period. The system would be operated for an estimated 6 months. If this criteria is used for terminating operation of the in-situ aeration system, the actual concentrations of chemicals remaining in the soil will not be known. In the cleanup plan developed by Regional Board staff (discussed below), an actual soil cleanup goal is established.

Regional Board believe that in-situ aeration is feasible and warranted in soils with greater than 1 ppm TCA, rather than only in soils with greater than 10 ppm TCA as proposed by Fairchild. The pilot in-situ aeration system operated in 1987 effectively removed an average of 8 pounds of chemicals per day from an air extraction well located near the 1 ppm TCA boundary. Additionally, Fairchild acknowledges that the most critical parameter affecting groundwater concentration levels on-site is the total chemical mass remaining when cleanup activities cease. Regional Board staff also believe the in-situ soil aeration system should be operated for longer than 6 months if the additional operation will facilitate achieving and maintaining drinking water action levels on-site.

STAFF'S RECOMMENDED FINAL CLEANUP PLAN

Regional Board staff have developed a final cleanup plan that addresses the concerns discussed above. The plans recommended by Regional Board staff and by Fairchild contain many common elements. Both recommend: (1) continued groundwater extraction off-site until an HI of 0.25 is achieved, (2) the addition of nozzle aeration for off-site discharge to Canoas Creek, (3) the use of in-situ soil aeration for cleaning up on-site soils, and (4) a biodegradation study for the on-site area. Specific elements of the staff's proposed plan are discussed below.

Development of the proposed plan was based on the RAP and on the Regional Board's evaluation of seven years of water and soil quality data. Samples have been collected and analyzed by the Regional Board to confirm the validity of data generated by the discharger. Some of the data were also revieved by EPA and found to be acceptable for limited purposes. The quality of the available data has been taken into consideration in developing the proposed final plan.

The possibility exists that the final remediation plan will be more efficient and rapid than expected. If that is the case, additional cleanup may be appropriate for Regional Board consideration at a later date to comply with the State Board policy to maintain the high quality of waters in the State of California.

OFF-SITE CLEANUP. Regional Board staff recommend that Alternative 7 (Groundwater Extraction and Discharge to Canoas Creek with Off-site Reinjection of Groundwater

Treated at the On-site Treatment System) be implemented for off-site cleanup to an HI of 0.25. This cleanup plan would entail the following:

1. Groundwater Extraction. Groundwater would continue to be extracted from off-site B aquifer wells RW-2, RW-22, and RW-25 at an initial combined rate of roughly 610 gpm (984 AF/yr). It is expected that wells RW-2 and RW-22 would only be needed for 2 years, after which time off-site extraction would be limited to well RW-25.

   It is not certain that, once extraction from RW-2 and RW-22 is curtailed, extraction from RW-25 will effectively remove chemicals from all parts of the plume containing chemicals above a Hazard Index of 0.25. Therefore, piezometers may be required to determine capture zones for off-site cleanup. Additional extraction wells may be required in the future to ensure that chemical concentrations throughout the plume are reduced to achieve an HI of 0.25.

   Additional monitoring wells are also proposed to determine plume boundaries in the area bounded by the following streets: Bernal Road, Via del Oro, Great Oaks Blvd, and Santa Teresa Blvd. (See Figure 2.)

2. Groundwater Treatment and Disposal. Groundwater extracted from RW-25 (approximately 50 gpm) would be piped on-site for air stripping treatment prior to reinjection off site. Existing wells located outside the slurry wall would be used for reinjection. Groundwater from other off-site wells (approximately 560 gpm) would to be discharged after nozzle aeration to Canoas Creek. Treatment levels required for discharge will be regulated under an NPDES permit. This permit is discussed on page 14.

3. Final Groundwater Cleanup Level. Cleanup activities would continue until an HI of 0.25 has been achieved off-site. This is expected to take 2 years except for the part of the plume controlled by RW-25. Groundwater would be extracted from this well for an estimated 5 years. Extraction wells would be sequentially shut down as cleanup goals are achieved in each part of the plume.

   There is a difficulty with relying solely on achieving an HI of 0.25 for determining final cleanup. Based on the current ratio of TCA to DCE, DCE must be reduced to 0.75 ppb and TCA must be reduced to 25 ppb to reach an HI of 0.25; however, DCE cannot be detected below approximately 1 ppb with current laboratory detection limits. If it is assumed that a chemical is not present when it cannot be detected by laboratory analysis, Fairchild would only be required to reduce DCE concentrations to below 1 ppb and TCA concentrations to below 50 ppb to achieve an HI of 0.25. Therefore, a second cleanup criterion is proposed to require that, if DCE is reduced to below laboratory detection limits, cleanup must continue until TCA concentrations have been reduced to 25 ppb.

4. Off-site Soil Pollution. As soil pollution has not been detected off-site, no soil cleanup levels will be established for the off-site areas. Soil borings may be required to establish that soil pollution above 1 ppm does not remain after off-site aquifers are cleaned up.

5. Groundwater Conservation. Water conservation would be addressed in part by the reinjection of groundwater from all on-site wells and off-site well RW-25(B). Additionally, the NPDES permit would be issued on the condition that Fairchild develop an acceptable plan by January 27, 1989 for reusing extracted groundwater. This requirement is discussed in more detail later in this report.

ON-SITE CLEANUP. Regional Board staff recommend that the Biodegradation Study and a modified version of Alt. 4 (In-situ Aeration of the A Aquifer and the AB Aquitard in Areas with TCA Concentrations Greater than 1 ppm and In-situ Soil Aeration of the B Aquifer) be implemented for on-site cleanup. This cleanup plan would entail the following:

1. Groundwater Cleanup Level. Pumping from on-site aquifers would continue until drinking water action levels (or other drinking water criteria for chemicals for which action levels have not been established) are achieved for each chemical unless Fairchild demonstrates that this is technically infeasible. The current drinking water action levels or other pertinent criteria are listed in Table 1. At a minimum, pumping from on-site aquifers would continue as long as significant levels of chemicals are being removed via on-site groundwater extraction. Currently, on-site extraction removes approximately 80 pounds of chemicals per year, compared to approximately 25 pounds per year from off-site extraction.

   If drinking water action levels cannot be achieved through in-situ soil aeration and continued extraction of on-site groundwater, Fairchild will be required to re-evaluate groundwater flushing of the on-site B aquifer to achieve drinking water action levels. Staff believe the effectiveness of in-situ soil aeration in removing chemicals from the dewatered portions of the B aquifer should be established and the results of the biodegradation study should be evaluated prior to requiring on-site groundwater flushing. When this information is available, Fairchild will be required to submit a report evaluating the feasibility of achieving this cleanup level and evaluating groundwater flushing if drinking water action levels have not been achieved on-site.

2. Soil Treatment. In-situ soil aeration would be required in dewatered portions of the B aquifer and in areas of the A aquifer and AB aquitard containing greater than 1 ppm TCA. Staff believe this can be accomplished without installing all of the 61 air extraction wells proposed by Fairchild in Alt. 4. Fairchild has already installed and started operation of an air extraction well system consisting of 37 extraction wells that effect the A and B aquifers and the AB aquitard. Regional Board staff recommend this system be operated for 1 month to initiate soil cleanup and determine the effect of the current system on soils in the 1 ppm TCA area. At the end of 1 month, Fairchild would submit a report documenting the effect of the current system on the 1 ppm area and proposing a final design for the aeration system to clean up soils with greater than 1 ppm TCA.

3. Soil Cleanup Goal. There is significant uncertainty regarding long-term operation of in-situ aeration systems; therefore, Regional Board staff have proposed that a soil cleanup goal be established rather than a soil cleanup level. A soil cleanup goal of 1 ppm each for TCA, DCE, PCE, Freon-113, and

xylenes is established for on-site soils. A different soil cleanup level may be acceptable if Fairchild demonstrates to the satisfaction of the Regional Board that higher levels of chemicals can remain in on-site soils without effecting groundwater concentrations in on-site aquifers. A different soil cleanup level may also be acceptable if Fairchild demonstrates to the satisfaction of the Regional Board that it is infeasible to achieve the cleanup goal of 1 ppm and that public health and safety will be protected.

No cleanup goals for acetone and IPA are proposed due to the low rate of migration of these chemicals from soils into groundwater, their potential for biodegradation, and the lower toxicity of these chemicals.

6. Integrity of the Slurry Wall. Fairchild's analysis of the slurry wall has determined that no loss of fine-grained soils from the slurry wall is expected to occur if a head differential across the slurry wall of less than 24 feet is maintained. Fairchild has estimated that this head differential provides a factor of safety of 4 with respect to decreased effectiveness of the slurry wall from loss of fines. The current head differential across the slurry wall is 19 feet on the up-gradient side of the slurry wall. As part of the final cleanup plan, Fairchild will be required to submit a plan containing measures that will be implemented to insure the continued integrity of the slurry wall if drinking water standards are not achieved in on-site aquifers.

7. Biodegradation Study. The Biodegradation Study would also be a component of on-site cleanup.

8. Deed Restriction. Fairchild would be required to file a deed restriction prohibiting use of on-site groundwater for drinking water and limiting other subsurface activities in order to protect and maintain the integrity of the slurry wall. The deed restriction would remain in-place until DHS drinking water action levels are achieved on-site.

NPDES PERMIT

The proposed WDR/NPDES permit establishes effluent requirements for reinjection into the off-site B aquifer, reuse, and direct discharge to storm drains leading to Canoas Creek.

Discharges to storm drains leading to Canoas Creek must meet best available technology economically achievable (BAT) effluent requirements. Based on draft EPA and State Board guidance and past NPDES permits issued by the Regional Board, air stripping or carbon absorption is usually considered BAT for discharges of groundwater to surface waters. Air stripping will be required for groundwater extracted from on-site wells and from off-site well RW-25. BAT effluent limits of 5 ppb for each volatile organic chemical will be established. These same limits must also be met prior to reuse of groundwater extracted from these areas. If the groundwater is reinjected, the discharge must meet a Hazard Index of 0.25 and be of better or equal quality than existing aquifer conditions. Treatment below 5 ppb for each volatile organic chemical to meet aquifer conditions would not be required.

Groundwater will also be extracted from off-site wells RW-2 and RW-22 until a Hazard Index of 0.25 is established in that part of the plume (Zone 2 in Figure

3.) Considering the low levels of chemicals currently extracted from these wells (less than 30 ppb in 1988), that extraction is only expected to be required for up to 2 years, the cost of designing and constructing an acceptable air stripping treatment system, and the time required to install the treatment system (estimated to be 11 months), air stripping will not be required for discharge to Canoas Creek or prior to reuse.

Nozzle aeration has been determined to be a low-cost, easily implemented mitigation measure that will be required for discharge to the storm drain of groundwater extracted from RW-2 and RW-22. Nozzle aeration is expected to remove 10 to 50 percent of the volatile chemicals in the discharge.

Until the nozzle mitigation measure can be installed, untreated groundwater from wells RW-2 and RW-22 will continue to be discharged to storm drains leading to Canoas Creek. Groundwater extracted from RW-25 and from on-site will continue to be treated using the existing air stripping system until the new air stripping system can be put in operation. (The existing system will not meet the effluent requirements of the new permit.) It is expected to take up to 9 months for the nozzles and the new air stripper to be operational.

Short term discharges resulting from monitoring well sample collection and aquifer testing in Zone 1 (see Figure 3) shall be treated using air stripping prior to discharge. Prior to operation of the new treatment system, the purge water from this area will be collected and either treated with the existing treatment system on site or diluted to meet a Hazard Index of 0.25 prior to discharge. Monitoring well purge water from all parts of the plume must be treated or diluted to meet an HI of 0.25 prior to discharge.

Fairchild has objected to the proposed NPDES permit conditions. They consider the additional costs for air stripping of the groundwater extracted from on-site wells and from off-site well RW-25 to meet effluent limitations of 5 ppb to be excessive. Instead, Fairchild has proposed the use of nozzle aertion for this discharge. Regional Board staff have evaluated costs for air stripping and determined that it is not excessive for BAT.

Fairchild has also objected to moving the compliance point from Canoas Creek, as established in the 1982 permit, to a point prior to discharge into the storm drain. The compliance point was changed primarily to accomplish compliance monitoring before other storm drain discharges mingle with the Fairchild discharge.

OBJECTIVES OF STAFF'S PROPOSED CLEANUP PLAN

The proposed final cleanup plan would meet the following objectives:

Overall protection of human health and the environment

The proposed final cleanup plan protects human health and the environment by requiring on-site aquifers to be cleaned up to drinking water action levels and by requiring off-site aquifers to be cleaned up to a level at least 4 times more stringent than drinking water action levels. The plan therefore prevents migration of chemicals above cleanup levels into drinking water supply wells. Human health is also protected by requiring a deed restriction to prohibit use

of on-site groundwater until health standards are achieved. Until cleanup levels are achieved in off-site aquifers, wells could potentially be drilled in areas of the plume containing chemical concentrations in excess of drinking water criteria. However, as part of their permitting process, the SCVWD would advise the potential well owner of the risks associated with such well installation. The proposed plan protects human health and the environment by preventing further vertical or horizontal migration of chemical concentrations above cleanup levels in the aquifers.

As required by the NPDES permit, groundwater containing high concentrations of chemicals is treated to levels below health standards, water quality standards and cleanup levels prior to being reused, reinjected, or discharged to surface waters. Beneficial uses of the receiving bodies, as defined in the San Francisco Bay Basin Plan, are protected. There will be some discharge of chemicals to the atmosphere from air stripping, in-situ soil aeration, and volatilization upon discharge to surface waters; however, concentrations at exposure points will be below background air levels for these chemicals (primarily TCA). Air emissions from the air stripper and the in-situ aeration system will also be controlled by the Bay Area Air Quality Management District (BAAQMD). By stopping the migration of chemicals from soil, and groundwater and treating portions of the extracted groundwater and air, potential threats to the environment are reduced.

Compliance with ARARs

Regional Board staff expect the proposed final cleanup plan will meet all ARARs.

A major requirement for meeting ARARs is achieving MCLs in aquifers that are an actual or potential source of drinking water. The numerical limits that apply to chemicals detected in the groundwater are listed in Table 1. This requirement will be met for off-site aquifers. The proposed order also requires that MCLs be achieved in on-site aquifers. In order to waive this requirement, Fairchild must demonstrate to the satisfaction of the Regional Board that it is technically impractical from an engineering perspective that on-site aquifers be cleaned up up to drinking water standards. Technical infeasibility, not cost, would be the major factor considered in waiving this ARAR. To date, Fairchild has not demonstrated technical infeasibility. If it is determined that drinking water standards cannot be achieved on-site using information obtained from implementation of the final cleanup plan, the order would have to be modified to waive the requirement. Even if MCLs are waived as a requirement in a modification to the proposed order, the final cleanup plan must still be protective of human health and the environment.

State Board Resolution 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California," is also an ARAR. This policy requires that any change in water quality must be consistent with maximum public benefit and not unreasonably affect beneficial uses. Fairchild estimated the amount of groundwater that would need to be extracted to achieve an off-site hazard index of from 1.0 to 0.0. (Note that costs required for off-site cleanup should be roughly proportional to the amount of groundwater extracted.) To reach an HI of 1.0 could be accomplished in 1 year by extracting 1000 acre-feet of water. An HI of 0.25 would require an estimated 5 years and 2,200 acre-feet of water. To reach an HI of 0 (which would require all pollutants to be below laboratory detection levels) would require the extraction of nearly 9 times more groundwater

than to reach an HI of 0.25 (18,000 acre-feet compared to 2,200 acre-feet). If feasible, it would require an estimated 14 years to achieve an HI of 0.

Regional Board staff believe that the proposed cleanup level of HI=0.25 provides the best balance of all concerns including cost, technical feasibility, groundwater conservation, and the requirements of State Board Resolution 68-16 for maintaining the high quality of the waters of the State.

The proposed cleanup level of meeting drinking water standards on-site is also consistent with State Board Resolution 68-16 considering the limitations of technical feasibility and that beneficial uses of the aquifers will be protected.

If new information indicates on-site and/or off-site cleanup levels cannot be reasonably attained or can be reasonably surpassed, the Board will decide if further final cleanup actions beyond those completed to attain cleanup levels shall be implemented at this site based, to a significant degree, on the information developed from implementation of the final cleanup plan. If changes in health criteria, administrative requirements, site conditions, or remediation efficiency occur, Fairchild must submit an evaluation of the effects of these changes on cleanup levels.

Reduction of toxicity, mobility, or volume

The proposed final cleanup plan focuses on treatment of the groundwater to specified cleanup levels. This will reduce the toxicity of the chemicals by reducing their concentrations. Mobility is reduced by use of the groundwater extraction system, preventing the further spread of the plumes. Also, by extracting and treating the groundwater, the volume of the plumes will be reduced. Use of the innovative technology, in-situ soil aeration, also reduces the toxicity of chemicals by reducing their concentrations. A major factor in the migration of chemicals through soils to the groundwater is their concentration; therefore, by reducing chemical concentrations in the soil, their mobility is also reduced.

Short term effectiveness

Fairchild's interim cleanup actions largely achieved short term protection. With the requirement of the on-site deed restriction, the proposed plan is fully effective in the short term.

Long term effectiveness and permanence

The recommended final cleanup plan provides long-term effectiveness and permanence by removing chemicals from off-site aquifers until an HI of 0.25 is achieved. Requiring on-site aquifers to be cleaned up to drinking water action levels and treating on-site soils using in-situ soil aeration also provides long-term effectiveness and permanence by removing chemicals from on-site soils and groundwater and by minimizing reliance on the slurry wall for protecting off-site aquifers.

Implementability

The off-site plan should be fully implemented within 9 months from adoption of the Order. The major portions of the on-site plan should also be implemented within 9 months from adoption of the Order.

Cost

The proposed final cleanup plan is cost effective based on an evaluation of costs for the entire cleanup, including groundwater and soil remediation, reclamation, and soil and groundwater treatment.

EPA and other agency acceptance

EPA and DHS staff have been actively involved in the review of the RAP and are in substantive agreement with the RWQCB staff preferred alternative.

Groundwater conservation

The proposed plan requires groundwater conservation to the maximum extent feasible. This is discussed in more detail below.

Public Acceptance

The public has had several opportunities to provide input on activities connected with the Fairchild site.

1. The State Board held a public workshop on February 5, 1988, to discuss groundwater extraction by IBM and Fairchild. Another State Board workshop (which was also open to the public) was held in June to discuss a proposed State Board order requiring reuse of groundwater extracted during the IBM and Fairchild cleanup operations. This order was adopted at the State Board meeting on July 21, 1988.

2. In March of this year, the Regional Board at a Public Hearing adopted Order 88-46 requiring Fairchild to submit a water conservation plan. A fact sheet was circulated to inform the public about the Order and public input was solicited and considered.

3. DHS released their epidemiological studies concerning the effects on the community from the consumption of water contaminated by the Fairchild release. Open forums were held on May 25 and June 28 to discuss their studies.

4. The Tentative Orders and the RAP were available for public review and comment from Novmeber 8 through December 8, 1988. Public comment was also received at the November 16 Regional Board meeting and at a public meeting held the evening of November 17, 1988, in San Jose. Additional public comment will also be accepted at the January 19, 1989 Regional Board meeting when the final orders will be adopted.

Public concerns expressed as a result of these activities have been addressed to the extent feasible in the proposed final cleanup plan. A responsiveness summary has been prepared addressing comments received.

UNRESOLVED ISSUES

Regional Board staff expect several areas of the proposed orders and final cleanup plan to be contested. Major issues include groundwater reuse, on-site groundwater cleanup levels, on-site soil cleanup goals, and operation of the in-situ soil aeration system. As previously discussed, conditions in the NPDES permit may also be contested.

1. Groundwater Reuse. On July 21, 1988, the State Board adopted Resolution 88-88 which requires that Fairchild and IBM develop a plan that results in the beneficial use of or treatment and recharge of a significant amount of their extracted groundwater. If use or recharge of significant amounts is not proposed, Fairchild (and IBM) shall fully justify reasons for not using or recharging the groundwater. The justification must also demonstrate why continued pumping is necessary from the standpoints of public health, protection of potential and present beneficial uses, maintaining high quality water, and providing the maximum benefit to the people of the State.

   The staff's recommended cleanup plan was developed considering groundwater conservation and the requirements of the State Board's Resolution. A major factor effecting Fairchild's ability to reuse the extracted groundwater is the length of time that extraction will continue. In order to conserve water, groundwater extraction wells will be shut down sequentially as cleanup levels are achieved in different portions of the aquifer. Extraction from two off-site wells (RW-19 and RW-27) with concentrations currently below an HI of 0.25 will be terminated as soon as the final Order is adopted, decreasing Fairchild's extraction by up to 500 gpm.

   Fairchild will be required to reuse or reinject all of the water that will be extracted from on-site and from off-site well RW-25 (resulting in the recharge of 480 acre-feet of water). This should result in 100 percent conservation for the last three years required for cleanup.

   Assuming an off-site cleanup level of HI=0.25, two of the other three off-site extraction wells should be shut down after two more years of pumping. Groundwater reuse or reinjection from these two wells is limited due to the 9 to 16 months that would be required to construct any necessary treatment and/or distribution systems, obtain permits, etc.

   The proposed SCR requires Fairchild to develop a groundwater conservation plan. This plan must contain the partial reinjection measure described above plus additional measures for reuse of extracted groundwater. The proposed order establishes a goal of 100 percent reuse; however, considering the short term nature (2 years) of the bulk of Fairchild's off-site extraction and that most potential users need water only on an intermittent basis, Fairchild's ability to implement a program for reusing a significant portion of their extracted groundwater will be limited.

   Another issue effecting groundwater reuse concerns EPA's interpretation of the Resource Conservation and Recovery Act (RCRA). The tank that failed released a RCRA hazardous waste into the subsurface. It is EPA's position that the polluted groundwater resulting from this release contains a RCRA hazardous waste, and, consequently, the groundwater must be disposed of in

accordance with RCRA regulations. If the groundwater is discharged to surface waters (e.g., Canoas Creek) under an NPDES permit, it is exempt from RCRA. However, if the groundwater is not discharged to the creek, it may have to be disposed of or reused, if possible, in accordance with RCRA. This could prohibit using the extracted groundwater for irrigation, construction, or other purposes, even though the groundwater meets drinking water standards.

Fairchild has contacted two potential users that appear interested in reusing the groundwater. One potential user, Live Oaks Farm, is currently using 600 gpm on an intermittent basis. This use of the water may have to be curtailed pending resolution of this issue. The other interested party is CalTrans. CalTrans may be able to use up to 50 gpm. Fairchild has indicated reuse by Caltrans is dependent on resolution of the RCRA issue.

Fairchild is expected to contest the part of the order requiring partial reinjection. Other parties have commented on this and other issues associated with groundwater conservation.

2. On-site Groundwater Cleanup Levels. Fairchild has objected to the proposed cleanup requirement of meeting drinking water standards on-site. Fairchild maintains that drinking water standards should not apply to the small amount of groundwater within the slurry wall and that this groundwater is hydraulically disconnected from other aquifers. Additional information concerning this issue is available in the responsiveness summary.

   Other parties have commented on the potential effect of the proposed cleanup plan on downgradient drinking water supply wells. As previously discussed, the concentrations expected to reach these wells are well below the drinking water action level of 200 ppb for TCA. The Regional Board also considered potential migration of chemicals into GO-4 when Order 88-46 was adopted. This Order allows up to 5 ppb TCA to migrate into compliance wells located within approximately 400 feet of GO-4.

   Unresolved issues associated with on-site soil goals and operation of the aeration system are connected to the differences between Fairchild's proposed plan and the final cleanup plan proposed by Regional Board staff.

KOLL COMPANY DEVELOPMENT

The Koll Company has proposed developing a shopping center on the property. Any development must not interfere with soil and groundwater cleanup and monitoring activities. Regional Board staff have met with Koll to discuss these conditions and to advise Koll that, as a property owner, they may be held liable for past and/or future discharges of pollutants. Fairchild is working with Koll to insure that cleanup activities and shopping center construction are compatible.

PUBLIC INVOLVEMENT

Community involvement has been actively encouraged by the Regional Board. All Regional Board and State Board orders which called for, modified, or effected the cleanup plans have been adopted at public hearings (Regional Board in August 1986, March 1987, and March 1988; State Board in February and June 1988). Additionally, DHS released their epidemiological studies concerning the effects

on the community from the consumption of water contaminated by the Fairchild release. Open forums were held on May 25 and June 28 to discuss these studies. Public input was requested for all of these activities and has been incorporated into the proposed orders to the extent feasible.

In preparation for adoption of the final Remedial Action Plan, the Regional Board has also taken or will take the following actions to involve the public in determining acceptable alternatives and in the final decision-making:

1. Staff sent out three fact sheets discussing the RAP and the proposed final cleanup plan. Persons receiving these fact sheets included adjacent neighbors, local government officials both appointed and elected, the water utilities using the groundwater, and those interested individuals that responded to several newspaper advertisements announcing the RAP process and decision-making.

2. The tentative orders for final cleanup have been circulated to concerned agencies, government officials, and citizens groups.

3. Prior to official release of the proposed final cleanup plan, Regional Board staff offerred to discuss the proposed plan with local officials and concerned environmental groups.

4. Initial testimony was received at the November 16, 1988, Regional Board meeting.

5. The Regional Board staff held an evening public workshop on November 17, 1988, in the vicinity of the Fairchild site.

6. The Administrative Record has been available to the public since the announcement of the tentative cleanup plan. The draft and revised versions of the cleanup plan have been available to the public in the Santa Teresa Public Library in the vicinity of Fairchild since September 1987 and in other libraries since the announcement of the tentative cleanup plan. Additionally, all reports (including all drafts of the RAP), correspondence, and other submittals contained in Regional Board files are available to the public during normal business hours and have been available as submitted since the initial discovery and Regional Board actions.

7. Comments were be accepted on the RAP and the proposed orders from November 8 until December 8, 1988. A responsiveness summary was prepared and circulated to parties expressing significant concerns.

8. The Final Remedial Action Plan will be adopted by the Regional Board in a public hearing where final comments on the Plan may be offered by the interested public.

ADVERSE IMPACTS RESULTING FROM IMPLEMENTATION OF THE PROPOSED FINAL CLEANUP PLAN

Implementation of the proposed final cleanup plan will impact the public and environment as described below.

One impact will be to residential roads and property. Pipes and nozzles will need to be installed in and adjacent to Via del Oro between Great Oaks Boulevard and San Ignacio Avenue (near extraction well RW-2). Additional monitoring wells and/or piezometers will be installed on private property once property owners grant access. This proposed off-site construction may interfere with traffic flow and residents in the area. This interference would last for the construction time necessary for each treatment unit and pipe to be installed, which should be a maximum of a few months. This impact is not considered to be signifcant.

A second impact will be redistribution of chemicals from the groundwater to the air, surface waters, and possibly landfills. The proposed nozzle treatment and air stripping treatment without activated carbon air treatment would transfer dilute concentrations of chemicals from the groundwater to the air. Spent activated carbon used with the in-situ soil aeration system and, if required by the Bay Area Air Quality Management District, with the air stripping system would be distributed to either landfills or to incinerators for chemical breakdown. Concentrations of chemicals below laboratory detection limits from Guadalupe River may recharge aquifers and may flow into the southern portion of the San Francisco Bay. These effects will not have a significant impact on public health.

A third impact would be that low chemical concentrations will remain in the aquifer and affect water supply wells. Chemical concentrations in down-gradient water supply well GO-4 are expected to reach up to 5 ppb TCA. The minimal increases allowed should not impact beneficial uses and will still be protective of human health. Chemical concentrations are not expected to be detected in other drinking water supply wells. Regional Board staff do not consider these effects to be significant.

RECOMMENDATION

1. The draft RAP as described in this report and amended by the addendum attached to this report and the Tentative Orders should be found generally acceptable based on the Health and Safety Code Section 25356.1.

2. The draft RAP as amended by the addendum attached to this report and the Tentative Orders should be considered to meet Section 121 of CERCLA as an equivalent to a feasibility study and found to be protective of human health and the environment, attain ARARs, be cost effective, utilize permanent solutions and alternative treatment technologies and resource recovery technologies to the maximum extent possible, reduce toxicity, mobility, and volume of pollutants, and address the concerns of the public.

January 5, 1989

STAFF REPORT

Concur: _____
Wil Bruhns, Section Leader

Concur: _____
for Steve Morse, Division Chief

Attachments: AGENCY ADDENDUM DATED DECEMBER 16, 1988

Figure 1 - SITE LOCATION
Figure 2- B AQUIFER TCA CONCENTRATIONS
Figure 3 - GROUNDWATER REMEDIATION ZONES
Figure 4 - OFF-SITE IMPLEMENTATION SCHEDULE

Table 1 - CHEMICAL CONCENTRATIONS IN AND DRINKING WATER CRITERIA FOR ON-SITE GROUNDWATER
Table 2 - OFF-SITE CHEMICAL CONCENTRATIONS AND DRINKING WATER STANDARDS
Table 3 - MAXIMUM SOIL CHEMICAL CONCENTRATIONS
Table 4 - OFF-SITE COSTS
Table 5 - ON-SITE COSTS
Table 6 - OFF-SITE CLEANUP TIMES

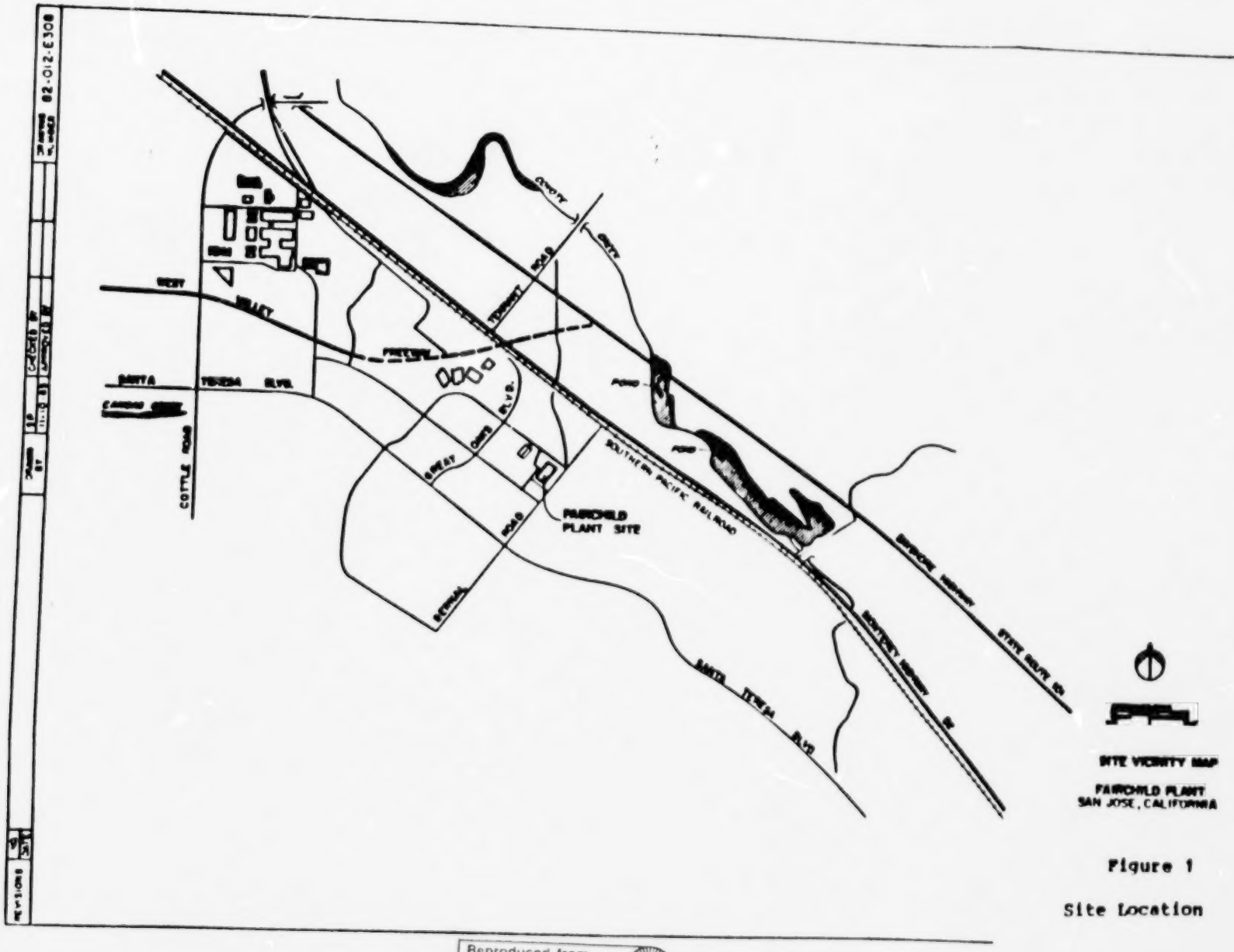

Figure 1

Site Location

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Figure 2

TABLE 4

COST SUMMARY FOR OFF-SITE CLEANUP ALTERNATIVES

Alt	HI	Capital Costs	Total O&M Costs	Total Cost	Present Worth Costs
1	---	$ 227,500	$ 745,400	$ 972,900	$ 690,400
2	1.0	227,500	2,329,800	2,557,300	1,825,400
2	0.25	227,500	4,124,800	4,352,300	3,037,300
3	1.0	2,802,200*	3,057,800*	5,860,000*	5,027,100*
3	0.25	2,802,200*	6,394,100*	9,196,300*	7,227,600*
4	1.0	1,981,400	2,512,900	4,494,300	3,745,700
4	0.25	1,981,400	5,191,800	7,173,200	5,589,000
5	1.0	1,200,200	2,596,400	3,796,600	3,040,400
5	0.25	1,200,200	5,292,700	6,492,900	4,907,500
6	1.0	1,602,400*	2,916,200*	4,518,600*	3,705,100*
6	0.25	1,602,400*	5,694,000*	7,296,400*	5,535,800*
7	1.0	457,200	2,367,800	2,825,000	2,089,600
7	0.25	457,200	4,314,800	4,772,000	3,411,000

* assumes pipeline easements can be negotiated (land would not have to be purchased)

TABLE 5

COST SUMMARY FOR ON-SITE CLEANUP ALTERNATIVES

Alt #	Capital Costs	Total O&M Costs	Total Cost	Present Worth Costs
1	$ 0	$ 332,500	$ 332,500	$ 155,600
2	318,800	4,877,000	5,195,800	1,940,700
3	2,202,800	2,436,500	4,639,300	4,221,000
4	3,532,500	2,916,900	6,449,400	5,982,100
5	2,941,300	6,207,300	9,148,600	7,642,300
6	4,198,100	11,237,600	15,435,700	11,868,900

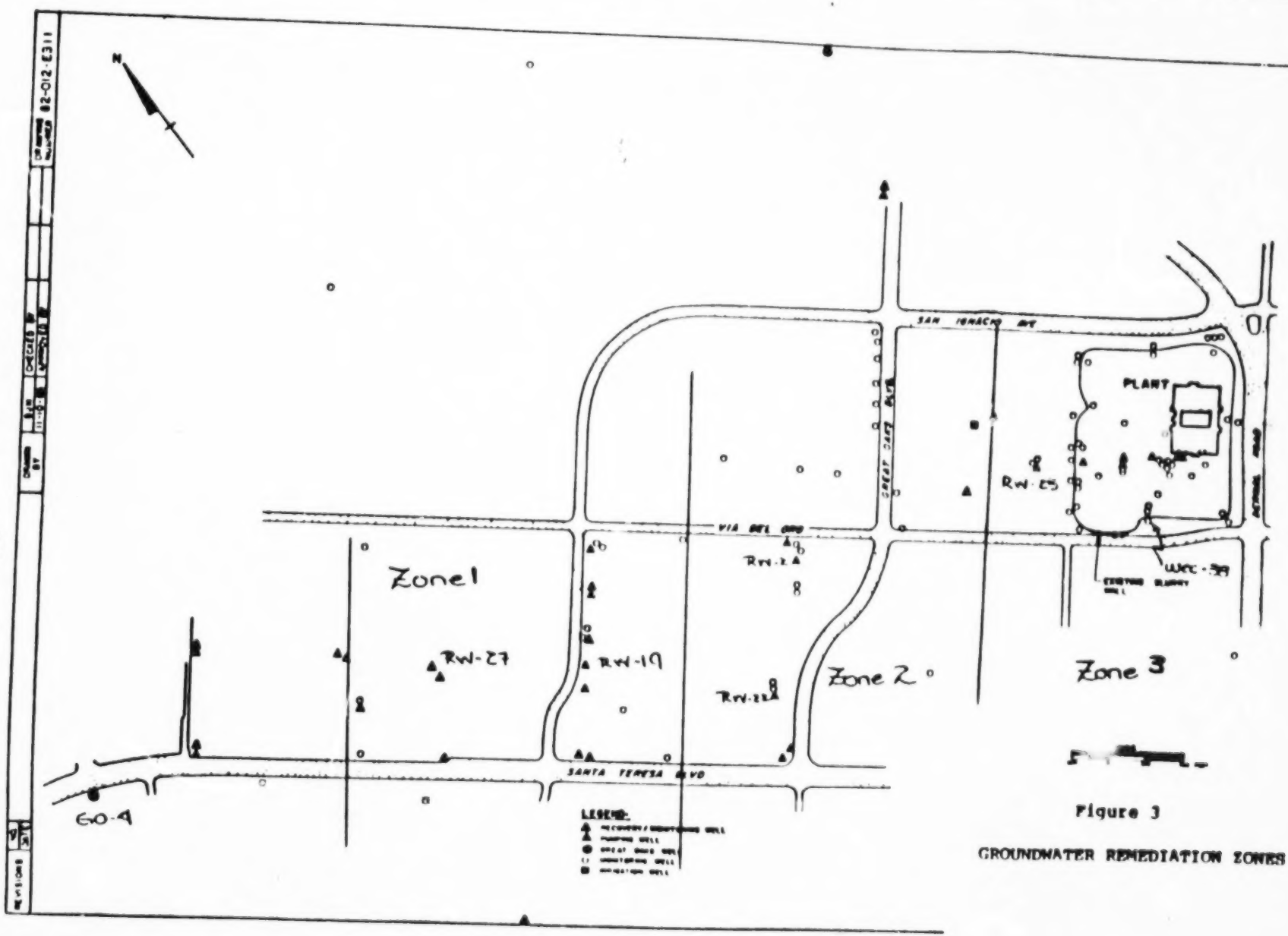
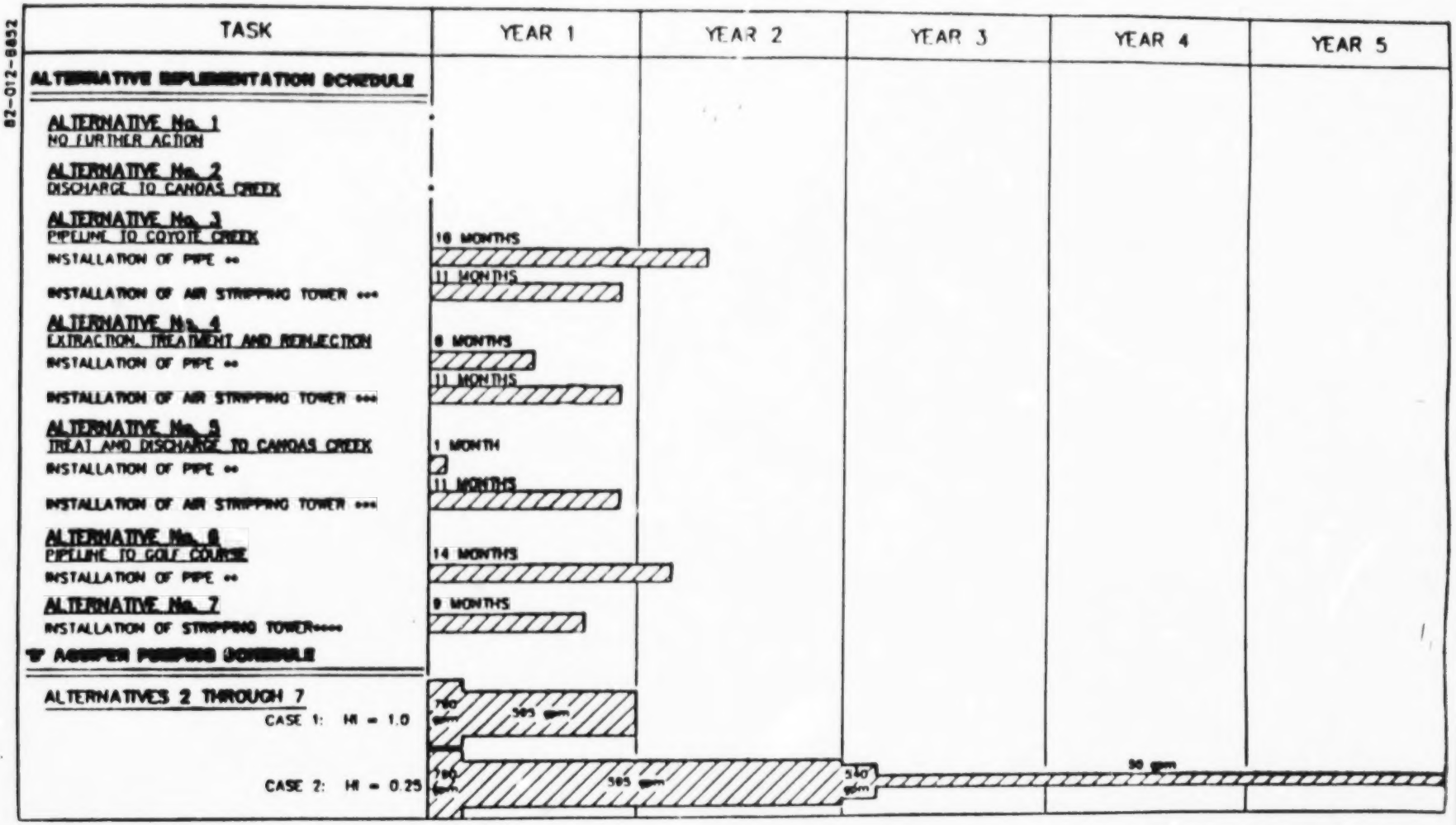


Figure 3

GROUNDWATER REMEDIATION ZONES



NOTES:

- IMPLEMENTATION OF THE ALTERNATIVE CAN BEGIN IMMEDIATELY.
- ** INSTALLATION INCLUDES DESIGN OF PIPING SYSTEM, LAND ACQUISITION (PERMITS, PURCHASING OF EASEMENT), TRENCHING, PIPE INSTALLATION AND JACKING UNDER ROADWAYS, RAILROADS, AND HIGHWAYS, AS APPLICABLE.
- *** INSTALLATION INCLUDES DESIGN, ACQUISITION OF PERMITS, AND CONSTRUCTION OF TOWER.
- **** INSTALLATION DOES NOT REQUIRE TIME TO NEGOTIATE FOR LAND USE.

REMEDIATION ALTERNATIVE IMPLEMENTATION TIME SCHEDULE

Figure 4

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TABLE 1

CHEMICAL CONCENTRATIONS IN ON-SITE GROUNDWATER

Chemical	1982 Maximum Concentration (ppb)	1987 Maximum Concentration (ppb)	DHS Drinking Water Action Level[1]
TCA	1,900,000	100,000	200
Xylenes	76,000,000	16,000	620[2]
Acetone	99,000,000	88,000	(3,500)[3]
IPA	45,000,000	5,700	(450)[3]
Freon-113	46,000	12	18,000
DCE	53,000	14,000	6
PCE	2,700	330	2[4]

[1] Except as noted, on-site groundwater cleanup levels are listed at DHS drinking water action levels as of the adoption of the Order. If DHS drinking water action levels change, on-site groundwater cleanup levels will change accordingly. If the MCL for any chemical becomes more stringent than the DHS drinking water action level, then the MCL shall be the cleanup level for that chemical.

[2] Value is for a single isomer or sum of the three.

[3] MCLs and DHS Drinking Water Action Levels have not been established these chemicals. The value for acetone is established based on the oral reference dose (Rfd) in the Integrated Risk Management Information System (IRIS). The value for IPA is based on the DHS Site Specific Remediation Criterion for IPA.

[4] The value for PCE is the proposed State MCL. If the final MCL is not the proopsed value of 2 ppb, the final cleanup goal shall be modified accordingly.

TABLE 2

OFF-SITE CHEMICAL CONCENTRATIONS AND DRINKING WATER STANDARDS

Chemical	1982 Maximum Concentration	Current Maximum Concentration[1]	DHS Drinking Water Action Level[2]
TCA	7,500 ppb	430 ppb	200 ppb
DCE	38 ppb	31 ppb	6 ppb

---

[1] Well 128(B) data collected 9-12-88
[2] Current DHS drinking water action levels are at least as stringent as current Maximum Contaminant Levels (MCLs).

TABLE 3

MAXIMUM SOIL CHEMICAL CONCENTRATIONS

	1982 Maximum Concentration			1988 Maximum Concentration		
Chemical	Concentration (ppm)	Boring #	Depth (ft)	Concentration (ppm)	Boring #	Depth (ft)
TCA	7,900	Caisson 149	34.0	8,200	SB-240	53
Xylenes	5,600	Caisson 31	32.0	3,700	SB-241	63
Acetone	12,000	Caisson 67	38.0	1,300	SB-263	40
IPA	30,000	Caisson 67	38.0	1,400[1]	SB-205	40
Freon-113	0.27	B-103	38.0	0.12	SB-249	52
DCE	160	B-113	31	63	SB-240	51
PCE	160	B-101	31	10	SB-242	64

[1] This concentration was detected in 1987, not 1988.

TABLE 6 - OFF-SITE CLEANUP TIMES

Cleanup Level	Off-site B Aquifer Cleanup Time (Years) Zone 1	Zone 2	Zone 3	Estimated Total Groundwater Extracted (Acre-feet)
HI-1.0	0	1	1	1000
HI-0.25	0	2	5	2000

December 16, 1988

ATTACHMENT TO THE STAFF REPORT

AGENCY ADDENDUM FOR

REMEDIAL ACTION PLAN - FAIRCHILD SEMICONDUCTOR CORPORATION

On October 7, 1988, Fairchild submitted a revised Remedial Action Plan (RAP) describing interim remedial activities, evaluating final cleanup levels and alternatives, and proposing a recommended final cleanup plan for their San Jose site. Regional Board staff have determined that the technical information contained in the RAP is acceptable for developing a final cleanup plan; however, Regional Board and other agency staff do not accept all interpretations and recommendations contained in the RAP. The RAP submitted October 1988 as modified by this Addendum, the staff report, the Site Cleanup Requirements for the site, and the NPDES permit satisfy the requirements of the Health and Safety Code for a final remedial action plan and the NCP requirements for a remedial investigation and feasibility study.

I. NPDES PERMIT. Fairchild obtained an NPDES permit in 1982 for the discharge of polluted groundwater to surface water. Prior to its expiration, Fairchild applied for a renewed NPDES permit from the Regional Board. Fairchild will receive a renewed NPDES permit as part of their final cleanup plan.

Fairchild's discharge can be divided into flows from two areas as shown in the attached figure: (1) groundwater extracted from Zone 3 (which includes off-site well RW-25 and pumping from within the slurry wall), and (2) groundwater extracted from Zone 2 (which includes off-site wells RW-22 and RW-2). If the final cleanup plan is adopted as proposed, there will be no extraction from Zone 1. Groundwater containing high chemical concentrations will be extracted from Zone 3 at a rate of up to 100 gpm. Groundwater extracted from Zone 2, up to 1100 gpm, will contain a maximum of 50 ppb TCA.

Fairchild maintains that the new NPDES permit should contain conditions essentially the same as those established in their 1982 permit (see RAP pgs 75-78, 114-116, and 174-175). Fairchild's proposal would allow all extracted groundwater to be discharged to Canoas Creek after nozzle treatment at permit limits of up to 5 ppm TCA.

NPDES permit conditions for the disposal of polluted groundwater must be established using Best Available Treatment Economically Achievable (BAT) based on Best Professional Judgment (BPJ). Regional Board staff maintain that Fairchild's proposal does not meet BAT/BPJ requirements. Staff's proposed BAT/BPJ permit requirements and monitoring requirements for the Fairchild-San Jose site are as follows:

A. Effluent Limitations. BAT/BPJ effluent limitations for the water extracted from Zone 3 would require air stripping to 5 ppb for most volatile organic compounds.

Groundwater extracted from Zone 2 will only be extracted for an estimated 2 years. It would take approximately one year to obtain the necessary permits and easements, and design and construct an off-site treatment system at a cost of approximately $2 million. Requiring air stripping treatment for this discharge would cost about $10,000 per pound of chemicals removed. The groundwater currently contains chemical concentrations well below drinking water standards and water quality criteria. Therefore, Regional Board staff propose allowing groundwater extracted from Zone 2 to be discharged after nozzle treatment to Canoas Creek. Effluent limitations will be proposed at current groundwater concentrations.

B. Nozzle Treatment. Fairchild has proposed that nozzle treatment is BAT/BPJ for the polluted groundwater. The nozzle system proposed by Fairchild would have an estimated removal efficiency of 10 to 50 percent. The flow would be discharged through nozzles directly into the storm drain, making monitoring after treatment dificult or impossible. Due to the uncertainties in treatment efficiency and the difficulty monitoring directly after the nozzles, Fairchild proposes that no treatment efficiency be required.

Regional Board staff maintain that these limitations preclude the designation of nozzle treatment as BAT/BPJ and that the system proposed by Fairchild is not a fully developed treatment system. As there may be some benefit to aerating the groundwater through nozzles prior to discharge, Regional Board staff have included the use of nozzles as a mitigation measure to allow an exemption to Basin Plan prohibitions and to decrease chemical concentrations entering surface waters.

C. Compliance Point. Fairchild has proposed that the monitoring point for determining compliance with permit restrictions be reestablished at the same point as in their 1982 permit. This location is approximately 20 feet downstream from where the storm drain containing Fairchild's groundwater discharges to Canoas Creek. Regional Board staff strongly object to this compliance point because: (1) Fairchild's discharge may mingle with other flows in the storm drain prior to discharging to Canoas Creek, (2) the compliance point should be established at a point where Fairchild maintains control of the discharge, and (3) it is very difficult to collect an unaerated sample at this point, causing the concentration of volatile compounds to be reduced when a sample is collected.

Regional Board staff propose the compliance point be established after the air stripping system for groundwater extracted from Zone 3 and prior to discharge into the storm drain for groundwater extracted from Zone 2.

II. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS. Cleanup at a Superfund site must comply with legally applicable or relevant and appropriate requirements (ARARs). Regional Board, EPA, and DHS staff disagree with several of Fairchild's conclusions regarding ARARs. ARARs for the site consist of the ARARs identified in pages 102-118 of Fairchild's RAP with the following modifications.

A. On-site Groundwater as a Potential Source of Drinking Water. Maximum Contaminant Levels (MCLs) established under the federal Safe Drinking Water Act (SDWA) must be achieved for potential sources of drinking water. Under State Board Resolution 88-63, "Adoption of Policy Entitled 'Sources of Drinking Water,'" groundwater contained within the boundaries of the slurry wall (on-site) meets the definition of drinking water and is therefore a potential source of drinking water. EPA's "Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy," Final Draft, December 1986, also establishes on-site groundwaters as a potential source of drinking water. Therefore, unless the requirements for waiving an ARAR are met (e.g., achieving MCL's is technically impracticable from an engineering perspective), MCLs must be achieved in on-site groundwaters.

Fairchild maintains that MCLs should not be established as the on-site cleanup level because: (1) State Board Resolution 88-63 is not an ARAR, and (2) the on-site groundwater is hydraulically disconnected from the aquifer system by the slurry wall.

Regional Board staff maintain that State Board Resolution 88-63 is an ARAR and MCLs are required on-site. Furthermore, staff questions whether slurry walls have been proven to provide permanent containment. Staff are also very concerned with the precedent established by allowing a slurry wall to determine that an aquifer that was previously a potential source of drinking water is no longer a potential source of drinking water. By proposing the slurry wall as a permanent cleanup solution and leaving chemical concentration above drinking water standards on-site, Fairchild is in effect creating a 22 acre hazardous waste disposal area.

B. SWRCB Resolution 68-16. The RAP states that State Board Resolution 68-16, "Statement of Policy with Respect to

AGENCY ADDENDUM

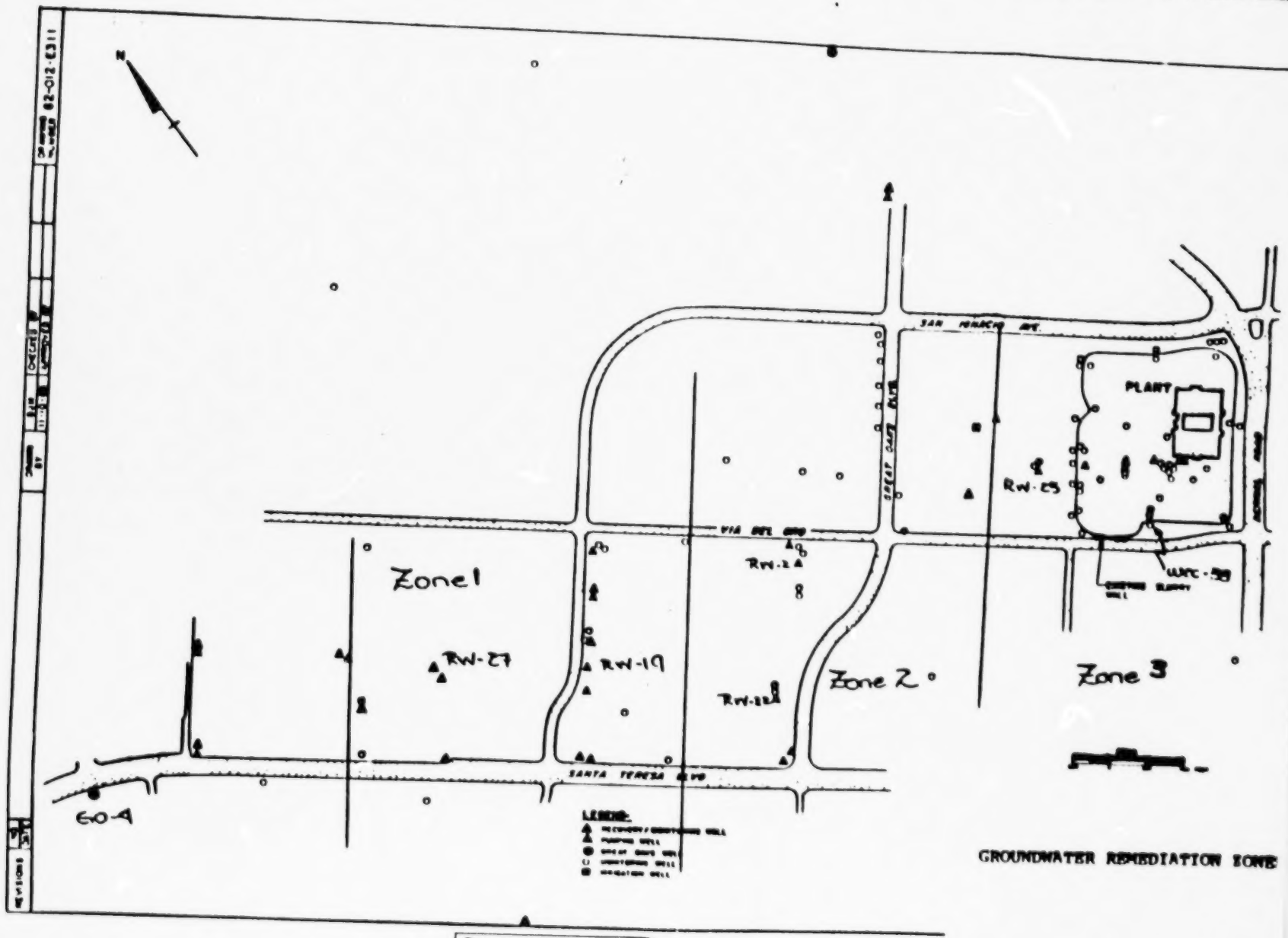
Maintaining High Quality of Waters in California" may not be an ARAR since "it is not clear whether the policy has been 'promulgated.'" Regional Board position is that State Board Resolutions are legally enforceable ARARs.

C. SWRCB Resolution 68-16 and Water Code Sections 100 and 275. California Water Code Sections 100 and 275 prohibit the unreasonable use of water. Fairchild maintains that these Water Code sections and Resolution 68-16 are in conflict because restoring the aquifers to background conditions would require the pumping of large quantities of water. Staff's positions is that the requirements of Resolution 68-16 and Water Code Sections 100 and 275 could both be fulfilled if the extracted groundwater was reused or reinjected.

D. Subchapter 15. Fairchild maintains that Title 23, Chapter 3, Subchapter 15 is not an ARAR for the site. Staff maintains that, if wastes are left on-site that need to be contained (as in Fairchild's proposed plan), the cleanup is subject to Subchapter 15 unless "remedial actions intended to contain such wastes at the place of release shall implement applicable provisions of this subchapter to the extent feasible" (Section 2511).

E. RCRA. Pollution at the Fairchild-San Jose site was caused by the failure of a tank containing a hazardous waste regulated by the Resource Conservation and Recovery Act (RCRA). Contrary to Fairchild's interpretation presented in the RAP, current EPA policy is that groundwater contaminated with a hazardous waste is subject to regulation by RCRA.

F. Reinjection. Under EPA's current interpretation of groundwater polluted by a RCRA hazardous waste, reinjection of extracted groundwater would be subject to the reinjection requirements of the Safe Drinking Water Act (SDWA). According to discussions with EPA staff, these requirements for Superfund activities are limited to reporting requirements.



GROUNDWATER REMEDIATION ZONE

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PART 3

SITE CLEANUP REQUIREMENTS ORDER

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

ORDER NO. 89-16

SITE CLEANUP REQUIREMENTS FOR:

FAIRCHILD SEMICONDUCTOR CORPORATION AND SCHLUMBERGER TECHNOLOGY CORPORATION
SAN JOSE
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Regional Board), finds that:

1. Site Location. Fairchild Semiconductor Corporation and Schlumberger Technology Corporation, hereinafter called the dischargers, owned and operated a semiconductor manufacturing facility at 101 Bernal Road in the City of San Jose. The dischargers operated the facility from April 1977 until the facility was closed in October 1983. The facility has been inactive since 1983.

2. Property Transfer. In 1987, all issued and outstanding shares of Fairchild stock were sold by Schlumberger Technology Corporation ("Schlumberger") to National Semiconductor Corporation. Following the sale, Schlumberger retained the site of Fairchild's former San Jose Facility. However, Fairchild retained all environmental liabilities associated with its past activities at the site. Schlumberger is currently managing the cleanup on behalf of Fairchild. Schlumberger has entered into a contract to sell the 22 acre site to the Koll Company. Koll plans to develop the property as a neighborhood shopping center.

3. Regional Board Orders. The Regional Board adopted Waste Discharge Requirements in Order No. 86-62 on August 20, 1986 for the dischargers' interim site cleanup. Order No. 87-16, adopted March 18, 1987, rescinded Order No. 86-62 and prescribed site cleanup requirements for the dischargers' interim cleanup. Order No. 87-16 was amended on March 16, 1988 by Regional Board Order No. 88-46. Orders 88-46 and 87-16 are rescinded by this Order. This Order sets tasks and submittal dates for final site remediation to be consistent with the Health and Safety Code and the National Contingency Plan.

4. Lead Agency Designation. The dischargers' San Jose site is proposed for inclusion on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The site is also included on the California Expenditure Plan for the Hazardous Waste Cleanup Bond Act of 1984. Pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Ground Water Contamination Enforcement Agreement, entered into on May 2, 1985 (as subsequently amended) by the Regional Board, the Environmental Protection Agency (EPA), and the Department of Health Services (DHS), the Regional Board has been acting as the lead agency overseeing cleanup of the site. The Regional Board will continue to regulate the dischargers' remediation and enforce

under CERCLA as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA).

5. Potential Responsible Parties. Pursuant to Health and Safety Code Sections 25356.1(d) and 25356.1(c), the dischargers are the only identified or known responsible parties associated with the release of pollutants to the subsurface.

6. Pollutants Detected. In November 1981, the dischargers discovered that an underground organic solvent tank had failed, releasing a mixture of solvents including 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), tetrachloroethene (PCE), isopropyl alcohol (IPA), xylenes, acetone, and 1,1,2-trichloro-1,2,2-trifluoroethane (Freon-113) to the subsurface. All of these chemicals have been detected in soils and groundwater within the dischargers' property boundaries. TCA, DCE, and Freon-113 have also been detected off-site. TCA is the pollutant that has been detected most frequently and in the highest concentrations.

7. Hydrogeology. Three aquifers, designated the A, B, and C aquifers, have been polluted by the release. The A aquifer varies from 10 to 40 feet thick and is first encountered at depths of 10 to 20 feet below the ground surface. The A aquifer is not continuous off-site (outside Fairchild's property boundaries) and is currently generally dewatered. The B aquifer is generally located between depths of 60 and 120 feet below ground surface. The C aquifer is generally found between 150 and 190 feet below ground surface. Only trace levels of pollutants have ever been detected below the B aquifer on-site or below the C aquifer off-site.

8. Interim Actions. The dischargers have been extracting groundwater from the Santa Teresa Basin as part of its interim cleanup program since January 1982. Other interim actions taken by the dischargers include removing the defective tank, excavating 3,389 cubic yards of soil, installing a slurry wall around the perimeter of the property, sealing potential conduits, and conducting pilot studies for on-site aquifer flushing and in-situ soil vapor extraction.

The dischargers' interim actions have brought the plume under hydraulic control, significantly reduced the size of the plume, and significantly reduced solvent concentrations within the plume. The length of the plume has been reduced from a maximum of 4,900 feet in October 1982 to approximately 2400 feet. The maximum concentration of TCA detected off-site has been reduced to 430 ppb (9-12-88 data) from 5600 ppb in November 1982. TCA concentrations in the C aquifer are below 5 ppb.

9. NPDES Discharge. The extracted groundwater has been discharged under an NPDES Permit, Regional Board Order No. 82-61, with and without treatment to storm drains leading to Canoas Creek. Canoas Creek is tributary to the Guadalupe River which flows into south San Francisco Bay. The Regional Board will reissue a NPDES permit as part of this cleanup plan. Under the new permit, volatile organic chemical concentrations of up to 100 ppb each chemical may enter Canoas Creek during the next two years. At the end of two years, discharge of most volatile organic chemicals to Canoas Creek must not exceed 5 ppb for each chemical.

Recharge from Canoas Creek may occur to a slight degree. The Guadalupe River provides significant recharge to shallow groundwater aquifers along

its length. No additional investigation of Canoas Creek recharge is planned due to the very low concentrations of chemicals currently being discharged into the creek by the dischargers and the insignificance of recharge in Canoas Creek.

10. The Slurry Wall. In 1986, the dischargers installed a 3-foot thick slurry wall around the perimeter of their property. The slurry wall is keyed into the BC aquitard and encloses approximately 22 acres. If a head differential across the slurry wall of less than 24 feet is maintained, no loss of fine-grained soils from the slurry wall is expected to occur. The dischargers have determined that this head differential provides a factor of safety of 4 with respect to decreased effectiveness of the slurry wall from loss of fines. The current head differential across the slurry wall is 19 feet on the up-gradient side of the slurry wall and less than 2 feet on the down-gradient side.

11. Groundwater Overdraft. As a result of aquifer cleanup, low rainfall, reduced active recharge efficiency, and increased groundwater extraction for water supply purposes, groundwater elevations have declined throughout the Santa Teresa Basin since 1981. In March 1988, the Regional Board adopted Order No. 88-46 requiring the dischargers to develop a water conservation program for the C aquifer. As a result of the water conservation program and the effectiveness of interim cleanup, the dischargers terminated groundwater extraction from the C aquifer on September 6, 1988.

12. Draft Remedial Action Plan. The dischargers have submitted a remedial action plan as required by Regional Board Order 87-16. The technical information contained in the remedial action plan (RAP) is consistent with the Health and Safety Code requirements for a final remedial action plan and the National Contingency Plan (NCP) requirements for a remedial investigation and feasibility study (RI/FS). The RAP contains an evaluation of interim cleanup actions, an evaluation of groundwater conservation measures, an evaluation of final cleanup alternatives, proposed cleanup levels, a recommended final cleanup plan, and a public health evaluation.

DHS and EPA have reviewed and commented on the draft RAP submitted by the dischargers. The initial draft RAP has been available for public review since September 1, 1987.

Regional Board staff have determined that the technical information contained in the revised RAP submitted October 7, 1988, is acceptable for developing a final cleanup plan for the site. In making this determination, staff did not accept the portions of the RAP addressing: (1) Applicable or Relevant and Appropriate Requirements (ARARs), and (2) the NPDES permit. These areas are addressed in the Addendum to the RAP dated December 16, 1988, prepared by agency staff. The RAP submitted October 7, 1988 as modified by the Addendum, the staff report, this Order, and Order No. 89-15 (NPDES Permit No. CA 0028185) satisfy the requirements of the Health and Safety Code for a final remedial action plan and the NCP requirements for a remedial investigation and feasibility study.

13. Cleanup Alternatives. In the RAP, the dischargers evaluated cleanup levels and alternatives separately for the on-site and off-site areas. The dischargers evaluated seven alternatives for off-site cleanup and six

alternatives for on-site cleanup. A complete description of these alternatives is contained in the RAP dated October 7, 1988 The alternatives were evaluated based on ten criteria: (1) overall protection of human health and the environment; (2) compliance with all federal and state applicable or relevant and appropriate requirements (ARARs); (3) reduction of toxicity, mobility or volume; (4) short term effectiveness; (5) long term effectiveness; (6) implementability; (7) cost; (8) State and EPA acceptance; (9) groundwater conservation; and (10) community acceptance.

14. Hazard Indices. The dischargers evaluated off-site groundwater cleanup levels using Hazard Indices (HIs). The HI is a method for assessing the public health risk associated with exposure to multiple chemicals. A HI equal to 1 indicates that all chemicals of interest are present at or below their relevant drinking water criteria. Hazard Indices are usually calculated separately for carcinogenic and non-carcinogenic chemicals. For the Fairchild site, Hazard Indices were only calculated for non-carcinogenic chemicals because there are no known potential carcinogenic chemicals in off-site groundwaters and only one potential carcinogen, PCE, has been detected on-site. PCE is present in on-site groundwater at a concentration of up to 85 ppb, which is equivalent to a carcinogenic Hazard Index of 21.3. DHS and EPA have reviewed the dischargers' proposed use of Hazard Indices and found that the indices appear to be justified for drinking water based on available data. These values may increase or decrease based on possible future changes in DHS drinking water action levels or other safe drinking water standards for these chemicals.

15. Final Cleanup Plan. Based primarily on information contained in the RAP, this Order provides for a final cleanup plan that includes:

a. Continued groundwater extraction from off-site aquifers until a cleanup level of HI=0.25 is achieved.

b. Continued groundwater extraction from on-site aquifers until drinking water quality is achieved, if feasible. If these levels are determined to be infeasible, on-site groundwater extraction shall continue as long as significant quantities of chemicals are being removed through groundwater extraction.

Achieving drinking water quality on-site is an Applicable or Relevant and Appropriate Requirement (ARAR) for this site. If drinking water quality cannot be achieved, the dischargers must demonstrate to the satisfaction of the Regional Board that the conditions for waiving an ARAR are met (e.g., that meeting the ARAR is technically impracticable from an engineering perspective) and that the alternative proposed will be protective of human health and the environment. The Order will then need to be modified by the Regional Board to allow a less stringent on-site groundwater cleanup level.

c. Cleanup of on-site soils containing greater than 1 ppm TCA using in-situ soil aeration. The cleanup goal for on-site soils is 1 ppm. A different soil cleanup level may be acceptable if: (1) the Executive Officer determines that higher levels of chemicals can remain in on-site soils without causing concentrations in on-site aquifers to increase when on-site pumping is terminated and the area within the slurry wall resaturates, or (2) the Executive Officer determines that it is infeasible to achieve the cleanup goal of 1

ppm and that public health and the environment will be protected. Information obtained from chemical desorption tests conducted of on-site soils will be considered in determining if a different soil cleanup level should be established.

d. Treatment by air stripping and reinjection of groundwater extracted on-site and from off-site well RW-25. If reinjection or reuse is attempted and determined to be infeasible by the Regional Board, the water will be treated using air stripping and discharged into storm drains leading to Canoas Creek.

e. Nozzle aeration of groundwater extracted from off-site wells except well RW-25 and then discharge into storm drains leading to Canoas Creek.

f. A goal of 100 percent for reusing off-site groundwater. Considering the short term nature (approximately 2 years) of the bulk of the dischargers' off-site extraction, the time required to construct necessary reuse facilities, and that most potential users need water only on an intermittent basis, the dischargers' ability to implement a program for reusing a significant portion of their extracted groundwater will be limited.

g. A laboratory and field study of biodegradation of on-site chemicals.

h. A re-evaluation of the feasibility and effectiveness of on-site groundwater flushing. This evaluation will be required in the five-year remedial program evaluation required under Provision 2.h of this Order if the cleanup efforts described above cannot reduce concentrations in on-site groundwater to safe drinking water levels.

i. A deed restriction. The dischargers shall be required to file a deed restriction prohibiting use of on-site groundwater for drinking water and limiting other subsurface activities in order to protect and maintain the integrity of the slurry wall. The deed restriction shall remain in place until safe drinking water levels are achieved on-site.

j. Additional monitoring wells. Additional monitoring wells will be required to define the boundaries of the plume in the area bordered by Bernal Road, Via del Oro, Great Oaks Boulevard, and Santa Teresa Boulevard. Piezometers may also be required to determine extraction well capture zones.

k. Long-term monitoring (for approximately 30 years) after cleanup levels are achieved.

16. **Final Cleanup Levels**. The cleanup level for off-site aquifers is HI=0.25 as clarified in Specification B.3 and in Table 1 of the groundwater self-monitoring plan attached to this Order. The cleanup goal for the on-site aquifers is the DHS drinking water action level or Maximum Contaminant Level (MCL), whichever is more stringent, for each of the following chemicals: TCA, DCE, Freon-113, and xylenes. The cleanup goal for PCE is 2 ppb based on the proposed State MCL. No action levels or MCLs have been established for acetone or IPA. The final cleanup goal for acetone, based on the oral reference dose in the Integrated Risk Management System

(IRIS) is 3500 ppb. The final cleanup goal for IPA is 2,250 ppb. This value is based on the DHS Site Specific Remediation Criterion for IPA, as explained in Table 2 of the Groundwater Self-Monitoring Plan attached to this Order. These cleanup levels and goals are at or below drinking water health criteria, action levels, and standards and will assure preservation of beneficial uses by maximizing the quality of groundwater to the maximum extent feasible.

The soil remediation goal is 1 ppm each for TCA, DCE, PCE, Freon-113, and xylenes. A goal is set due to the technical uncertainties associated with remediation of soil by means other than excavation and disposal which is no longer feasible due to prohibitive cost and is not the preferred remediation method as it does not treat the soil or reduce the volume of chemicals. This goal will be re-evaluated based on the results of in-situ soil aeration and chemical desorption test results for the soil and evaluation of cleanup efforts.

17. Future Changes to Cleanup Levels. The dischargers are expected to achieve the cleanup goals of this final cleanup plan within 5 years. If new information indicates cleanup levels cannot be reasonably attained or can be reasonably surpassed, the Regional Board will decide if further final cleanup actions beyond those completed shall be implemented at this site, based to a significant degree on the information developed pursuant to this Order. If changes in health criteria, administrative requirements, site conditions, or remediation efficiency occur, the dischargers will submit an evaluation of the effects of these changes on cleanup levels specified in Specification B.3, B.4, and B.6 and on Tables 1 and 2 of the groundwater self-monitoring plan attached to this Order.

The Regional Board recognizes that the dischargers have already performed extensive investigative and remedial work on-site and off-site and that the dischargers are being ordered hereby to perform substantial additional remedial tasks. It is in the public interest to have the dischargers undertake such remedial actions promptly and without prolonged litigation or the expenditure of public funds. The Regional Board recognizes that an important element in encouraging the dischargers to invest substantial resources in undertaking such remedial actions is to provide the dischargers with reasonable assurances that the remedial actions called for in this Order will be the final remedial actions required to be undertaken by the dischargers. On the other hand, the Regional Board also recognizes its responsibility to protect water quality, public health, and the environment and that future developments could indicate that some additional remedial actions may be necessary. The Regional Board has considered and balanced these important considerations, and has determined that the remedial actions ordered herein represent the Regional Board's best, current judgment of the remedial actions to be required of the dischargers. The Regional Board will not require the dischargers to undertake additional remedial actions with respect to the matters previously described herein unless: (1) conditions on the site, previously unknown to the Regional Board, are discovered after the adoption of this Order, or (2) new information is received by the Regional Board, in whole or in part after the date of this Order, and these previously unknown conditions or this new information indicates that the remedial actions required in this Order may not be protective of public health and the environment. The Regional Board will also consider technical practicality, cost effectiveness, State Board Resolution No. 68-16 and the other factors

evaluated by the Regional Board in issuing this Order in determining whether such additional remedial actions are appropriate and necessary.

18. Groundwater Conservation. On July 21, 1988, the State Board adopted Resolution No. 88-88 which required that Fairchild and IBM remediation plans must result in beneficial use of or recharge to the Santa Teresa Basin of a significant amount of extracted groundwater. If use or recharge of significant amounts is not proposed for the period after January 31, 1989, the dischargers must fully justify reasons for not using or recharging the groundwater. The justification must also demonstrate why continued pumping is necessary from the standpoints of public health, protection of potential and present beneficial uses, maintaining high quality water, and providing the maximum benefit to the people of the State.

The dischargers currently propose to treat the bulk of off-site groundwater by nozzles with no additional use prior to discharge to storm drains leading to Canoas Creek; however, the dischargers are evaluating the feasibility of reusing the groundwater resulting from the cleanup activities. If an opportunity for additional reuse occurs, the dischargers will evaluate that potential reuse based on the conditions set forth under the California Water Code Section 13550.

The Regional Board intends to strongly encourage, and require to the extent allowed by law, the maximum reuse of extracted groundwater feasible either by the dischargers or other public or private water users. This Order requires groundwater conservation and reuse measures to be consistent with State Board Order 88-88. These measures include reinjection or reuse of groundwater extracted from on-site wells and from off-site well RW-25, if feasible, and requiring the dischargers to submit a plan for reusing extracted groundwater, with a reuse goal of 100 percent. Due to factors beyond the dischargers' control, the dischargers may be unable to attain the 100% reuse goal established by this Order. The dischargers will not be found to be in violation of this Order if documented factors beyond the control of the dischargers prevent the dischargers from attaining 100% reuse, provided that the dischargers made a good faith effort to attain that goal.

19. Evaluation of Final Plan. In accordance with the Health and Safety Code Section 25356.1, Section 121 of CERCLA, the final remedial action plan (including the RAP submitted by the dischargers on October 7, 1988, the Addendum dated December 16, 1988, this Order, and Order No. 89-15 (NPDES Permit No. CA 0028185) is equivalent to a feasibility study; satisfies the requirements of the California Water Code Section 13304 and is protective of human health and the environment; attains Applicable or Relevant and Appropriate Requirements (ARARs); utilizes permanent solutions and alternative treatment technologies and resource recovery technologies to the maximum extent possible for short term effectiveness; is implementable; is cost effective; is acceptable based on State regulations, policies, and guidance; reduces toxicity, mobility, and volume of pollutants; and addresses public concerns.

20. State Board Resolution 68-16. On October 28, 1968, the State Board adopted Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California". This policy calls for maintaining the existing high quality of State waters unless it is demonstrated that any

change would be consistent with the maximum public benefit and not unreasonably affect beneficial uses. This is based on a Legislative finding, contained in Section 13000, California Water Code, which states in part that it is State policy that "waters of the State shall be regulated to attain the highest water quality which is reasonable." The original discharge of wastes to the groundwater at this site was in violation of this policy; therefore, the groundwater needs to be restored to its original high quality to the extent reasonable. Based on available information, as found in the dischargers' technical reports "Remedial Action Plan, Fairchild Semiconductor Corporation, San Jose Facility" dated September 1987 and revised May 1988 and October 1988, the change in water quality does not unreasonably affect beneficial uses and is consistent with the maximum public benefit as defined in State Board Resolution No. 68-16. This limited degradation would not exceed any established water quality policies; the remediation water quality levels proposed for off-site are well below current applicable health criteria; and the levels do restore the quality of the groundwater to the extent reasonable given technical and economic constraints. These constraints include the high additional incremental costs for removal of small amounts of additional pollutants and the need to minimize the removal of groundwater to achieve acceptable cleanup levels.

21. Water Supply Wells. Great Oaks Water Supply Company drinking water supply well GO-13 was contaminated with pollutants from the dischargers' release. GO-13 was removed from service in December 1981 and has since been destroyed and sealed. As a result of interim cleanup, groundwater in Great Oaks well GO-4, a drinking water supply well located down-gradient from the site, has remained free of detectable concentrations of volatile organic chemicals. TCA concentrations of up to 5 ppb may reach the B aquifer in the vicinity of GO-4 and lower concentrations may reach the B aquifer in the vicinity of other down-gradient Great Oaks wells after the dischargers have obtained an HI of 0.25 in off-site aquifers and discontinues groundwater extraction. (The DHS drinking water action level for TCA is 200 ppb.)

22. Pumping and recharge activities within the Santa Teresa Groundwater Basin by others affect vertical and lateral hydraulic gradients and may impact plume migration control at the Fairchild site and off-site. Furthermore, the overall imbalance in the hydrologic budget for the Santa Teresa Groundwater Basin is beyond the sole control of the dischargers.

23. The final remediation plan is conceptual and provides a basis for remedial design.

24. Development of this final cleanup plan was based on the Regional Board's evaluation of seven years of water and soil quality data. Samples have been collected and analyzed by the Regional Board to confirm the validity of data generated by the dischargers. Some of the data was reviewed by EPA and found to be acceptable for limited purposes. The quality of this data has been taken into consideration in developing the final cleanup plan.

25. The Regional Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 16, 1986. The Basin Plan contains water quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and groundwaters.

26. The existing and potential beneficial uses of the groundwater underlying and adjacent to the facility include:

    a. Industrial process water supply
    b. Industrial service water supply
    c. Municipal and domestic water supply
    d. Agricultural water supply

27. The dischargers have caused or permitted, and threaten to cause or permit, waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance. On-site and off-site final containment and remediation measures need to be implemented to alleviate the threat to the environment posed by the plume of pollutants.

28. This action is an order to enforce the laws and regulations administered by the Regional Board. This action is categorically exempt from the provisions of the CEQA pursuant to Section 15321 of the Resources Agency Guidelines.

29. The Regional Board has notified the dischargers and interested agencies and persons of its intent under California Water Code Section 13304 and California Health and Safety Code Section 25356.1(d) to prescribe Site Cleanup Requirements and to issue a remedial action plan for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.

30. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code and Section 25356.1 of the California Health and Safety Code, that the dischargers shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.

2. Further significant migration of chemicals above cleanup levels as described in Specification B.3 and B.4 through subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of chemicals are prohibited.

B. SPECIFICATIONS

1. The storage, handling, treatment or disposal of soil or groundwater containing chemicals shall not create a nuisance as defined in Section 13050(m) of the California Water Code.

2. The dischargers shall conduct monitoring activities as needed to define and detect changes in the local hydrogeologic conditions and the lateral and vertical extent of soil and groundwater containing chemicals. Should monitoring results show evidence of plume migration above cleanup levels as described in Specification B.3, and, during remedial action, above 0.5 ppb DCE in Zones 2 and 3 as shown in Figure 1 of the Self-Monitoring Plan attached to this Order, additional plume characterization may be required.

3. Final cleanup levels for chemical concentrations in off-site wells containing chemicals from the dischargers' facility shall be equal to or less than an HI of 0.25.

The HI is calculated as shown:

$$\sum_{i-1}^{n} \frac{\text{concentration of chemical "i"}}{\text{safe drinking water level for chemical "i"}}$$

At the time of this Order, DHS Drinking Water Action Levels are the most stringent safe drinking water criteria for chemicals detected off-site. DHS Action Levels shall be used to calculate the off-site HI unless Maximum Contaminant Levels (MCLs) or other final, duly-promulgated drinking water standards become the most stringent safe drinking water level.

4. Final groundwater cleanup goals in on-site aquifers shall be equal to or less than the DHS drinking water action level or Maximum Contaminant Level, whichever is more stringent, for each of the following chemicals: TCA, DCE, PCE, Freon-113, and xylenes. No action levels or MCLs have been established for acetone or IPA. The final cleanup goal for acetone, based on the oral reference does in the Integrated Risk Management System (IRIS) is 3500 ppb. The final cleanup goal for IPA, based on the DHS Site Specific Remediation Criterion for IPA as explained in Table 2 of the Groundwater Self-Monitoring Plan attached to this Order, is 2,250 ppb.

5. Final chemical concentrations shall not be found to exceed the appropriate cleanup level based on the moving annual average of analytical results as determined at the end of each quarter.

The moving annual average shall be calculated each quarter for each well using the 4 most recent quarterly sampling results. If the moving annual average for any well in any quarter increases by 50% or more relative percent difference (RPD) from the previous quarter, which will be considered a baseline quarter, then the dischargers shall inform the Regional Board by telephone of such an increase as soon as the dischargers or the dischargers' agent have written laboratory results indicating such an increase. The dischargers shall confirm this notification in writing within two weeks of the telephone notification. As part of the quarterly monitoring report for the quarter in which the concentration increase occurred, the dischargers shall submit to the Regional Board a technical report acceptable to the Executive Officer containing an evaluation of the occurrence and proposal for corrective action. The report shall

include a proposal for increased monitoring and an evaluation of the costs, benefits and drawbacks of modifying active hydraulic cleanup and containment measures in comparison with a continued monitoring alternative.

The quarter prior to the quarter in which an RPD of 50% or greater was detected shall be established as the baseline quarter. The moving annual average for the baseline quarter shall be established as the baseline average. If the second quarterly average following the baseline quarter is still 50% or more RPD above the baseline average and the dischargers have not implemented a corrective action program, and the concentrations are above final cleanup levels, then a threatened violation is present and the dischargers shall inform the Regional Board of the causes of this threatened violation. If the third quarterly average is an increase of 50% or more RPD from the baseline average and concentrations are above final cleanup levels then the dischargers shall be considered to be in violation of this order and shall inform the Regional Board of how and when the dischargers will regain compliance.

6. The dischargers shall cleanup soil to a goal of 1 ppm for each of the following chemicals: TCA, DCE, xylenes, Freon-113, and PCE. This goal may be modified by the Executive Officer if the dischargers demonstrate with site specific data that higher levels of chemicals in the soil will not threaten the quality of waters of the State or that cleanup to this level is infeasible and human health and the environment are protected.

7. The dischargers shall optimize, with a goal of 100%, their use of the groundwater extracted from their groundwater cleanup activities to aid the cleanup and minimize water level declines. The dischargers shall not be found to be in violation of this Order if documented factors beyond the dischargers' control prevent the dischargers from attaining 100% reuse, provided that the dischargers have made a good faith effort to attain that goal. Factors effecting the dischargers' ability to achieve the reuse goal include but are not limited to: (1) whether the extracted groundwater must be disposed of in accordance with Resource, Conservation, and Recovery Act (RCRA) regulations, and (2) cooperation from local water suppliers in reusing the water.

8. Off-site compliance points shall be established at all monitoring wells which at any time are outside the 0.25 HI plume boundary. After on-site activities except for monitoring are completed, on-site compliance points shall be established at all wells which are or will be within the boundaries of the slurry wall. Notwithstanding this specification, the dischargers may seal monitoring wells outside the 0.25 HI plume boundary upon approval of the Executive Officer.

9. The dischargers shall maintain extraction wells WCC-20, RW-2, RW-22, and RW-25 in operable condition until the cleanup levels are attained throughout the entire plume area.

10. The dischargers shall implement the final cleanup plan described in Findings 12, 13, 14, 15, and 16, as modified by this Order.

C. PROVISIONS

1. The dischargers shall submit to the Regional Board acceptable monitoring program reports containing results of work performed according to a program prescribed by the Regional Board's Executive Officer.

2. The dischargers shall comply with this Order immediately upon adoption and the dischargers shall further comply with the PROHIBITIONS and SPECIFICATIONS above, in accordance with the following tasks and compliance time schedules:

a. GROUNDWATER CONSERVATION

1) COMPLETION DATE: February 10, 1989

TASK 1: FINAL PLAN FOR GROUNDWATER REUSE AND REINJECTION. Submit a technical report acceptable to the Executive Officer describing the groundwater reuse plan associated with the final cleanup plan. The report shall include documentation of efforts to reuse the water, efforts to secure users for the water, reasons why potential users would not accept the water, and justification for why the pumped water cannot be used for beneficial uses (including direct reuse as drinking water) or returned to the Basin as of January 31, 1989. The report shall address reuse under each of the following conditions: (1) regulation of the extracted groundwater under RCRA does not effect reuse efforts, and (2) regulation of the extracted groundwater under RCRA does effect reuse efforts. The report shall also include a proposal for reinjection of groundwater extracted on-site and/or from off-site well RW-25 and plans to study potential clogging of injection wells and potential effects of reinjection on the plume boundaries. An implementation schedule for reinjection and other reuse measures shall be included.

2) COMPLETION DATE: May 15, 1989

TASK 2: DOCUMENTATION OF GROUNDWATER REUSE. Submit a technical report acceptable to the Executive Officer documenting the completion of the necessary tasks identified in the technical report submitted for Task 1 except for tasks associated with reinjection of extracted groundwater. This technical report may be submitted as part of the quarterly monitoring report that is due May 15, 1989.

3) COMPLETION DATE: May 15, 1990

TASK 3: DOCUMENTATION OF REINJECTION. Submit a technical report acceptable to the Executive Officer documenting the implementation of on-site and/or off-site reinjection as proposed in Task 1, evaluating the

effect of reinjection on the plume boundaries, and presenting the results from the well clogging study. This technical report may be submitted as part of the quarterly monitoring report that is due May 15, 1990. If reinjection is determined to be infeasible, such determination shall be made by the Regional Board.

b. IN-SITU SOIL AERATION

1) COMPLETION DATE: March 1, 1989

TASK 4: **IN-SITU SOIL AERATION SYSTEM INTERIM DESIGN REPORT.** Submit a technical report acceptable to the Executive Officer documenting the construction and operation of the in-situ soil aeration system for treating soils with TCA concentrations greater than 10 ppm. The report shall contain soil boring logs, well construction details, results from soil chemical testing, and air monitoring results (laboratory chemical analyses, OVA monitoring, and flow measurements). The report shall also document construction and operation of any necessary additional on-site groundwater extraction well or wells.

2) COMPLETION DATE: August 15, 1989

TASK 5: **MODIFICATIONS TO IN-SITU SOIL AERATION SYSTEM.** Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the existing system in removing volatile chemicals from soils containing greater than 1 ppm TCA and proposing any modifications needed to cleanup soils containing greater than 1 ppm TCA. The report may be submitted as part of the quarterly status report that is due August 15, 1989.

3) COMPLETION DATE: November 15, 1989

TASK 6: **IN-SITU SOIL AERATION SYSTEM FINAL DESIGN REPORT.** Submit a technical report acceptable to the Executive Officer documenting the completion of any modifications to the in-situ soil aeration system identified in Task 5. This technical report may be submitted as part of the quarterly monitoring report due on November 15, 1989.

4) COMPLETION DATE: 45 days prior to expected termination of the in-situ aeration system

TASK 7: **PROPOSAL TO TERMINATE OPERATION OF THE IN-SITU SOIL AERATION SYSTEM.** Submit a technical report acceptable to the Executive Officer containing a proposal for terminating operation of the in-situ soil aeration system and the criteria used to justify termination of system operation. The proposal shall include cycling of the system to determine if concentrations increase after the system is temporarily shut down and then reac-

tivated. This report shall also include a proposal indicating the locations of and sampling intervals for soil borings to determine chemical concentrations remaining in the soils.

5) COMPLETION DATE: Due date for quarterly status report for the quarter in which operation of the in-situ soil aeration system is terminated.

TASK 8: COMPLETION OF ON-SITE SOILS REMEDIATION. Document in the appropriate quarterly report the completion of the necessary tasks identified in the technical report submitted for Task 7 including the chemical results from samples from the soil borings.

c. DEED RESTRICTION

1) COMPLETION DATE: February 15, 1989

TASK 9: PROPOSED DEED RESTRICTION. Submit a technical report acceptable to the Executive Officer containing a draft deed restriction for prohibiting use of on-site groundwaters for drinking water supply and prohibiting activities that could potentially undermine the integrity of slurry wall. The deed restriction shall remain in effect until drinking water action levels are achieved in on-site aquifers. This report may be contained in the monthly status report due February 15, 1989.

2) COMPLETION DATE: May 15, 1989

TASK 10: FILING OF THE DEED RESTRICTION. Submit a technical report acceptable to the Executive Officer documenting that the deed restriction has been filed with the Santa Clara County Recorder's Office. This report may be contained in the quarterly status report due May 15, 1989.

d. ADDITIONAL ON-SITE INFORMATION

1) COMPLETION DATE: May 15, 1989

TASK 11: PROPOSAL FOR DETERMINING DESORPTION OF CHEMICALS FROM ON-SITE SOILS. Submit a technical report acceptable to the Executive Officer containing a proposal for obtaining site-specific information about the desorption of chemicals from on-site soils to groundwater. This report may be contained in the quarterly status report due May 15, 1989. In lieu of a proposal, the dischargers may submit results from desorption tests already performed. If acceptable to the Executive Officer, these test procedures shall satisfy the requirements of both Task 11 and Task 12.

2) COMPLETION DATE: August 15, 1989

TASK 12: RESULTS OF DESORPTION TESTING. Submit a technical report acceptable to the Executive Officer containing the results from the desorption testing. This report may be submitted as part of the quarterly status report due August 15, 1989.

e. ADDITIONAL OFF-SITE INFORMATION

1) COMPLETION DATE: May 1, 1989

TASK 13: PROPOSAL FOR NEW MONITORING WELLS. Submit a technical report acceptable to the Executive Officer containing a proposal for determining the boundaries of the plume in the area bounded by the following streets: Bernal Road, Via del Oro, Great Oaks Boulevard, and Santa Teresa Boulevard.

2) COMPLETION DATE: July 3, 1989

TASK 14: DEFINITION OF PLUME BOUNDARIES. Submit a technical report acceptable to the Executive Officer documenting the completion of tasks identified in the technical report submitted for Task 13.

f. CURTAILING OFF-SITE GROUNDWATER EXTRACTION

1) COMPLETION DATE: four months prior to proposed implementation of off-site groundwater extraction curtailment

TASK 15: OFF-SITE WELL PUMPING CURTAILMENT CRITERIA AND PROPOSAL. Submit a technical report acceptable to the Executive Officer which contains a proposal for curtailing pumping from off-site groundwater extraction wells and the criteria used to justify such curtailment. The proposal shall include temporary curtailment of extraction well operation for an extended period of time to study the effects on pollutant migration prior to well abandonment. This report should identify the method, specific monitoring wells, and the basis for the time frame to be used to determine that final cleanup levels have been reached and that the potential for increases above cleanup levels in concentrations is minimal. This report shall include supporting data for and an evaluation of water quality in areas believed to be remediated. As the dischargers intend to curtail use of extraction wells in a sequential manner as cleanup levels are achieved, the report shall contain an evaluation of capture zone confirmation for remaining extraction wells and a proposal for installation of additional piezometers and monitoring wells as needed. This report shall also provide for soil borings in the saturated and unsaturated portions of the B aquifer to determine residual soil chemical concentrations. Notwithstanding this provision, the dischargers may begin

curtailing the pumping of extraction wells RW-19(B) and RW-27(B), in accordance with the proposal contained in the RAP submitted October 1988, without submitting a technical report.

2) COMPLETION DATE: 30 days after Regional Board approves off-site curtailment

TASK 16: **OFF-SITE CURTAILMENT IMPLEMENTATION**. Submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for Task 15.

g. CURTAILING ON-SITE GROUNDWATER EXTRACTION

1) COMPLETION DATE: two months prior to proposed implementation of on-site groundwater extraction curtailment

TASK 17: **ON-SITE WELL PUMPING CURTAILMENT CRITERIA AND PROPOSAL**. Submit a technical report acceptable to the Executive Officer containing a proposal for curtailing pumping from on-site groundwater extraction wells and the criteria used to justify such curtailment. This report shall identify the method and the basis for the time frame to be used to determine that final cleanup levels have been reached and that the potential for increases above cleanup levels in concentrations is minimal. The report shall contain an evaluation of the feasibility of reducing on-site groundwater concentrations to equal to or less than the cleanup levels listed in Table 2 of the groundwater self-monitoring plan. The report shall also propose a revised analysis based on actual final soil and groundwater concentrations for estimating future chemical migration through the slurry wall and through the on-site AB aquitard.

If the dischargers determine that it is not feasible to achieve these cleanup levels, the report shall evaluate the maximum reductions in on-site groundwater concentrations that can be achieved. Additionally, the report shall contain a proposal for insuring the long-term integrity of the slurry wall, specifically addressing the potential loss of fines if the hydraulic gradient across the slurry wall becomes excessive.

2) COMPLETION DATE: 30 days after Regional Board approves on-site curtailment.

TASK 18: **ON-SITE CURTAILMENT IMPLEMENTATION**. Submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for Task 17.

h. 1) COMPLETION DATE: January 18, 1994